

1 SUPERIOR COURT OF THE STATE OF CALIFORNIA

2 IN AND FOR THE COUNTY OF ORANGE

3
4 ORANGE COUNTY WATER DISTRICT,)

5 Plaintiff,)

6 vs.) No. 04CC00715

7 NORTHROP CORPORATION, et al.,)

8 Defendants.)

9
10 AND OTHER RELATED ACTIONS.)

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12
13
14
15 DEPOSITION OF GLENN D. TOFANI

16 Costa Mesa, California

17 Thursday, March 15, 2012

18 Volume 2

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22
23 Reported by:

24 MARIANNA DONNER

CSR No. 7504

25 JOB No. 304146

1 SUPERIOR COURT OF THE STATE OF CALIFORNIA

2 IN AND FOR THE COUNTY OF ORANGE

3
4 ORANGE COUNTY WATER DISTRICT,)

5 Plaintiff,)

6 vs.) No. 04CC00715

7 NORTHROP CORPORATION, NORTHROP)

GRUMMAN CORPORATION, AMERICAN)

8 ELECTRONICS, INC., GULTON)

INDUSTRIES, INC., MARK IV)

9 INDUSTRIES, INC., EDO)

CORPORATION, AEROJET-GENERAL)

10 CORPORATION, MOORE BUSINESS)

FORMS, INC., AC PRODUCTS,)

11 INC., FULLERTON MANUFACTURING)

COMPANY, FULLERTON BUSINESS)

12 PARK LLC, and Does 1 through)

400, inclusive,)

13 Defendants.)

14 _____)

15 AND OTHER RELATED ACTIONS.)

_____)

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19
20 Videotaped Deposition of

21 GLENN D. TOFANI, Volume 2, pages 228

22 through 441, taken on behalf of Plaintiff

23 at 650 Towne Center Drive, Costa Mesa,

24 California, beginning at 9:16 a.m.

25 and ending at 4:33 p.m. on Thursday,

1 March 15, 2012, before MARIANNA DONNER,
2 Certified Shorthand Reporter No. 7504,
3 Registered Professional Reporter
4 No. 38410.

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3 WITNESS EXAMINATION

4 GLENN D. TOFANI
Volume 2

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9 DEPOSITION TIME LOG 439

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11 EXHIBITS

12 PLAINTIFF'S PAGE

13 23 Color copy of a document entitled 246
"Northrop EMD Site Assessment Summary,"
14 dated 3-13-12, 88 pages

15 24 Color copy of a document entitled 247
"Summary Report for North EMD Site,"
16 dated 3-13-12, 163 pages

17 25 Color copy of a document entitled 247
"EMD Site Assessment Summary
18 Attachments A, B & C," dated
19 3-13-12, 71 pages

20 26 Photocopy of a document entitled 247
"Appendix C12 Northrop's
Electromechanical Division,
21 500 East Orangethorpe Avenue,
Anaheim, CA," 34 pages

22 27 Photocopies of documents entitled 295
23 "Measured Concentrations in Groundwater,"
24 224 pages

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4	PLAINTIFF'S	PAGE
5	28 Color copy of a map entitled	294
6	"Site Plan for EMD Facility," dated	
	March 2012, 1 page	
7	29 Photocopy of Expert Report of	299
8	Richard Kent Waddell, Jr., Ph.D.,	
	PG, dated 8-23-11, 174 pages	
9	30 Photocopy of a document entitled	314
10	"Evaluation of Environmental Conditions	
11	and Remediation Issues Former Northrop	
12	Electronic Systems Division," by Dames	
	& Moore, dated 5-13-91, 202 pages	
	Bates Numbers NGSC-37517 through	
	37707	
13	31 Photocopy of a document entitled	325
14	"Results of the March 1993 Groundwater	
15	Quality Sampling and Analysis Northrop	
16	Electronics Systems Division, Anaheim,	
	California," 67 pages	
	Bates Numbers NGSC-06621 through	
	06687	
17	32 Photocopy of a document from	360
18	J.B. Watson to Robert Senga,	
19	re: Reported Spill of 28 August	
20	1985, dated 9-6-85, 7 pages	
	Bates Numbers NGSC-OCHA006450 through	
	006456	
21	33 Photocopy of a technical memorandum	363
22	to Glenn Tofani from Norm Colby,	
	Re: Summary of Groundwater Flow	
	Model, dated 3-13-12, 26 pages	
23	34 Photocopy of a document entitled	376
24	"Project Invoices for OCWD vs.	
25	NORTHROP, et al., Circulation	
	Well Activities," 1 page	

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3 EXHIBITS

4 PLAINTIFF'S PAGE

5 35 Color copy of a document entitled 379
6 "Critical Review of Tetra Tech
Cost Estimates," 127 pages

7 36 Photocopy of a document entitled 409
8 "Project Invoices for OCWD vs.
NORTHROP, et al., Expert Designation
Assignment," 1 page

9 37 Photocopy of a document entitled 411
10 "Kester Solder Site Assessment
Summary," dated 3-13-12, 5 pages

11 38 Color copy of a document entitled 429
12 "Summary Report for Kester Solder
Site," dated 3-13-12, 50 pages

13 39 Color copy of a document entitled 429
14 "Summary Report for Kester Solder
Site Report Figures," dated 3-13-12,
15 40 pages

16

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18 WITNESS INSTRUCTED NOT TO ANSWER

19 PAGE LINE

20 409 9

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1 Costa Mesa, California

2 Thursday, March 15, 2012

3 9:16 a.m. - 4:33 p.m.

4

5 THE VIDEOGRAPHER: Good morning. Here begins
6 media number 1, Volume 2, in the deposition of Glenn
7 Tofani.

8 Today's date is March 15, 2012, and the time
9 on the video monitor is 9:16 a.m.

10

11 GLENN D. TOFANI,

12 having previously been sworn,

13 was examined and testified as follows:

14

15 EXAMINATION

16 BY MR. MILLER:

17 Q Good morning. You are still under oath.

18 A Good morning.

19 (Plaintiff's Exhibit 23 was
20 marked for identification and is
21 attached hereto.)

22 BY MR. MILLER:

23 Q Exhibit 23, this is your document dated
24 March 13, 2012, entitled "Northrop EMD Site
25 Assessment Summary," which contains your opinions; is

1 that correct?

2 A Yes. At least a summary of what I
3 characterize as the primary opinions that I have.

4 (Plaintiff's Exhibit 24 was
5 marked for identification and is
6 attached hereto.)

7 BY MR. MILLER:

8 Q Exhibit 24 is your summary report for the
9 EMD site?

10 A Yes.

11 (Plaintiff's Exhibit 25 was
12 marked for identification and is
13 attached hereto.)

14 BY MR. MILLER:

15 Q Exhibit 25 are the Attachments A, B and C
16 that go with your EMD site assessment summary; is
17 that correct?

18 A Yes.

19 (Plaintiff's Exhibit 26 was
20 marked for identification and is
21 attached hereto.)

22 BY MR. MILLER:

23 Q And then I've marked as Exhibit 26
24 Mr. Waddell's Appendix C12 concerning the
25 electromechanical division.

1 You reviewed that document, correct?

2 A Yes.

3 MR. SLOME: Do you have an extra copy?

4 MR. MILLER: Yes.

5 Q In your expert report, did you identify the
6 areas at the EMD site where there were releases of
7 chemicals of concern to the environment?

8 A Yes, I believe so.

9 Q Where does that appear in your report?

10 A There's a section entitled "3.0 Documented
11 Releases" which lists one by one the areas where
12 releases were either identified and confirmed or
13 reported anecdotally.

14 Q Please turn to your summary report for the
15 EMD site, Exhibit 24.

16 Do you have it?

17 A Yes.

18 Q Under the heading "Documented Releases,"
19 paragraph number 4, you described the discovery in
20 August 1985 of a badly deteriorated cast iron
21 drainpipe that was located under the building,
22 correct?

23 A Yes.

24 Q So any solvents that went into that drain
25 would have been released to the environment, correct?

1 A Not in total, but a portion of any
2 wastewater that was conveyed by that drain
3 potentially would have been released.

4 Q Since the pipe itself was leaking, wouldn't
5 that provide a driving force to take water containing
6 solvents downward through the subsurface?

7 A That depends to some degree on how much
8 water it leaked and also on the concentration of
9 solvents that were present within the pipe. Although
10 it's likely, based on the conditions that I've seen,
11 that some leakage occurred, the data overall suggests
12 that the volume of leakage was not large and also
13 that the concentration of solvents that were
14 contained in the wastewater that was conveyed by that
15 pipe were low.

16 Q The bottom of portions of the pipe was
17 missing, correct?

18 A Yes, it's my understanding.

19 Q So your comment that there may have been
20 releases, doesn't that understate the case? When a
21 bottom of a pipe is missing, both the water and
22 whatever it contains are released in significant
23 quantities and can provide a driving force to go down
24 through the subsurface because you are continuously
25 adding water to the soil, correct?

1 A I think it's safe to say that there were
2 releases at that location where the pipe was damaged.
3 I don't know if I would describe them as large
4 quantities or potentially not even significant
5 quantities, but certainly it would appear that there
6 were releases.

7 Q Weren't there spills on the floor that went
8 into this drainage system?

9 A There certainly was water -- wastewater that
10 was spilled onto the floor that went into the
11 drainage system, yes.

12 Q That would have contained solvents, correct?

13 A That would have contained low concentrations
14 of solvents.

15 Q For how many years did this go on where the
16 pipe was not intact?

17 A I don't know if that's been documented. The
18 discovery of the pipe occurred in August of 1985, and
19 it was repaired or addressed very shortly after that.

20 Q Isn't it your understanding that the reason
21 the pipe deteriorated is that they were using
22 caustics and acids in the discharge in the pipe?

23 A Yes, I think that was certainly a
24 contributing factor.

25 Q Where do you discuss the concentrations in

1 the vicinity of the pipe discharge?

2 A The concentrations of solvents in the
3 wastewater that was being conveyed by the pipe?

4 Q Yes. Or environmental samples in and around
5 the pipe.

6 A There would be references to the reported
7 VOC levels in the wastewater in Attachment A.

8 Q That would vary depending on when you took
9 the sample and what was occurring that day, correct?

10 A I would expect it would vary to some degree.

11 Q So where are the environmental samples
12 results?

13 A For?

14 Q The area where the sewer pipe may have
15 contaminated the soil.

16 (Whereupon Mr. Adams joined the
17 proceedings via telephone.)

18 THE WITNESS: A site plan showing all of the
19 soil sampling locations at the site is provided as
20 Figure 10.

21 The location of the printed wire board
22 circuit room and the general area of the deteriorated
23 drain line is shown in Figure 2. That would
24 essentially be the southern central portion of the
25 Y-1 building if you are looking at Figure 10.

1 In the area of AWD -- W-7 boring extending
2 along the exterior of the building in the area of the
3 AWDL series borings. There are roughly 16 or 18
4 borings located in that area.

5 BY MR. MILLER:

6 Q And the closer you are to the location of
7 the clarifier in the pipe, the higher the
8 concentration, correct?

9 A I don't know without looking at the data in
10 the summary table.

11 Q If you look at the number beneath the
12 identification of the boring, take, for example,
13 AWDV-1, it says 31.0.

14 Is that feet or a measurement of
15 contamination?

16 A That's depth and feet.

17 Q So the contamination is not posted here?

18 A Correct.

19 Q So where do we go to get the contamination
20 in that area?

21 A Those results should be summarized in
22 Table 2 of the report, which is 35 pages in length.

23 Q In your opinion, was 1,1-DCE released to the
24 environment at that location, referring to the cast
25 iron drain line?

1 A Not that I've seen documentation of.

2 Q 1,1,1-TCA?

3 A Likely, yes.

4 Q How would that not cause DCE contamination
5 if it's in water?

6 A The TCA would tend to degrade into DCE.

7 Q Table 2 is preclosure soil testing results?

8 A Yes.

9 Q In the AWD series of samples, was that taken
10 in the vicinity of the sewer pipe?

11 A Yes.

12 Q There are concentrations in the thousands
13 for TCA, including as high, on this page at least, of
14 5309.

15 MR. SLOME: What page are you talking about?

16 MR. MILLER: 13 of 35.

17 Q Correct?

18 A Are you talking about AWD boring location
19 D6?

20 Q Yes.

21 A Yes. That was the reported concentration,
22 although that does not appear to be a boring that was
23 located in the vicinity of the PWD room.

24 Q So it's only a portion of the AWD sampling
25 that's in that vicinity, correct?

1 A Correct.

2 Q Is it the T series?

3 MR. SLOME: Is what the T series?

4 BY MR. MILLER:

5 Q AWDT sampling series in the vicinity of the
6 ductile iron pipeline.

7 A It would include AWDW series or a portion of
8 that, and the AWDL series or a portion of that.

9 Q What page does that appear on?

10 MR. SLOME: Of the soil testing results?

11 MR. MILLER: Correct.

12 THE WITNESS: I don't see those listed in this
13 table.

14 BY MR. MILLER:

15 Q And there aren't any soil gas reports
16 either, are there?

17 A Summarized in Table 2?

18 Q Table 3 is soil VOC testing results. Is
19 that soil gas?

20 A Yes.

21 Q Are there any samples there near the
22 pipeline that are displayed in your data tables?

23 MR. SLOME: Whose phone is that?

24 THE WITNESS: There were soil gas samples
25 collected, it appears by I believe Targhee, in that

1 area.

2 BY MR. MILLER:

3 Q Where does that appear in your tables?

4 A I don't believe those are summarized in the
5 tables.

6 Q Why is the data in that area missing from
7 your summary report?

8 A Apparently the soil matrix data was not
9 summarized in any of the tables that we have.

10 Q All right. Let's talk about testing types.

11 Wasn't it generally known by the late '80s
12 that soil gas testing for VOCs like PCE and TCE was
13 the best way to find any contamination because it
14 spread further and, therefore, could be found more
15 readily?

16 MR. SLOME: Objection; assumes facts.

17 THE WITNESS: You said by the late 1980s?

18 BY MR. MILLER:

19 Q Yes.

20 A I would say during the late '80s and early
21 to mid-'90s there was a general recognition of that
22 and a gradual transition from predominantly soil
23 matrix testing to soil gas testing.

24 Q Soil matrix testing kind of averages the
25 concentrations and doesn't give you discrete

1 sampling, correct?

2 A Well, soil matrix testing gives you discrete
3 samples and can you give you discrete results, but
4 it's easier to miss elevated VOC levels with soil
5 matrix sampling. With soil gas sampling, as long as
6 you are in the general vicinity of contamination you
7 are going to detect it, and that doesn't necessarily
8 hold true with soil matrix sampling.

9 Q What is the difference, briefly stated,
10 between a soil matrix sample and other types of soil
11 samples?

12 A Well, soil matrix sampling is physically
13 collecting a sample of the soil and then analyzing
14 that sample for its VOC content or concentration.

15 Q Potentially over a significant volume of
16 soil?

17 A Well, a typical sample that would be
18 collected and submitted for a lab for matrix testing
19 most commonly would be a six-inch long sample
20 contained in an either brass or a stainless steel
21 sleeve.

22 Q Is that how Northrop's consultants did it at
23 this site, the soil matrix testing?

24 A They did do soil matrix testing, yes.

25 Q How did they do it at this site?

1 A I would have to look back at the specific
2 reports, but certainly they would drive samples that
3 were collected into rings or sleeves and submit it
4 for analysis.

5 Q Where in your report did you analyze the
6 environmental data around the ductile iron pipe to
7 see what type of and what extent of contamination it
8 caused? Is that discussed in the narrative portion
9 of your report?

10 A The data, environmental data itself?

11 Q Something describing what the chemicals were
12 and the range of concentrations, whether it's
13 minimum, maximum or average, is that discussed in
14 your report?

15 A There's a notation of the measured VOC
16 levels in the wastewater that were detected in the
17 sump areas in the technical document summary of the
18 report.

19 Q Right.

20 But since that's variable on a daily basis
21 depending on what they were doing, I would like to
22 know what analysis you have in the narrative of the
23 concentrations in the environment measured near or
24 around the pipe.

25 MR. SLOME: Objection; argumentative, assumes

1 facts.

2 BY MR. MILLER:

3 Q Is that in the narrative portion of your
4 report?

5 MR. SLOME: Same objection.

6 THE WITNESS: There is a discussion of some of
7 the sampling that was done in the area of the PWB
8 sump and lift station, which is in the area that
9 we're discussing on page 5. There's an investigation
10 performed at that location by Bechtel in November of
11 1986, and it talks about the maximum, or identifies
12 the maximum soil VOC levels that were identified.

13 BY MR. MILLER:

14 Q The sump is part of a different area and was
15 basically found to be leaking because of multiple
16 penetrations that weren't sealed.

17 A Well, there's more than one sump. There's a
18 sump/clarifier/lift station associated with the
19 printed wire board room and then there's the anodic
20 room sump that I think you were just referring to.

21 Q Well, on page 9 of your report, the summary
22 report -- I'm sorry. Page 3, paragraph 9, it states
23 "Deteriorated concrete along with apparent leakage
24 from the anodic room sump was discovered" in October
25 1986, correct?

1 A Yes.

2 Q That's an area where the sump was so
3 deteriorated they could take a screwdriver and push
4 it through what was supposed to be intact concrete,
5 correct?

6 A I don't know if I saw reference to a
7 screwdriver but I did see reference to a metal probe,
8 which I suppose could have been a screwdriver, that
9 they were able to push through the corner of the
10 concrete channel at the sump.

11 Q So the point is, that sump is in the anodic
12 room, and I'm asking you about the ductile iron pipe
13 leakage.

14 Where do you discuss the concentrations
15 associated with the ductile iron pipe?

16 A On page 5, third paragraph down.

17 Q We may not be on the same page. I'm seeing
18 a "PWB sump/lift station" referred to. Is that what
19 you are referring to?

20 A Yes.

21 Q Does this directly bear on releases from the
22 ductile iron pipe?

23 A The ductile iron pipe that we've been
24 discussing discharged or conveyed wastewater to this
25 sump.

1 Q When the ductile iron pipe left the
2 building, what -- did it extend along the southern
3 end of building Y-1 in the EMD area?

4 A Yes.

5 Q And did it go to Orangethorpe Avenue?

6 A The pipe that outlet from the sump
7 originally, it's my understanding, continued to
8 Orangethorpe Avenue. The deteriorated section that I
9 believe was described was located between the printed
10 wire board room and the sump. After the wastewater
11 pretreatment system was installed at the site, the
12 sump was converted into a lift station and the line
13 no longer continued from the clarifier to the public
14 sewer line in Orangethorpe. It was directed to the
15 pretreatment plant, and from that point the
16 pretreated water was discharged into the sanitary
17 sewer system.

18 Q At page 5 you state the detections near this
19 so-called sump in November of 1986 were 1,700 parts
20 per billion for TCE, 340 parts per billion for TCA
21 and 50 parts per billion for DCE, correct?

22 A That's in the area of the anodic room sump.
23 The PWB sump had a maximum identified TCA
24 concentration of 36 micrograms per kilogram at a
25 depth of 10 feet.

1 Q So is it fair to say that although you
2 discussed the related sump, you did not discuss in
3 your narrative report the ductile iron pipe and its
4 potential to cause environmental contamination?

5 A As discussed, the presence of that pipe is
6 discussed under item 4 on page 2.

7 Q I'm talking about the nature and extent of
8 contamination and where it went in the environment
9 from the ductile iron pipe.

10 A The testing results that we were just
11 referring to on page 5 talks about measured TCA
12 levels at that location or in that area.

13 Q At the sump in the anodic room?

14 A No. It does talk about the sump in the
15 anodic room also. Those are the higher VOC levels
16 that you mentioned a moment ago.

17 But in the paragraph above that, it talks
18 about the VOC levels that were measured at the
19 location of the PWB sump, which is where the ductile
20 iron line was located.

21 Q At locations, whether it's a sump or a pipe,
22 where fluid, especially water, is being continuously
23 released to underlying soil because they are not
24 intact and are leaking, doesn't that drive VOC
25 contamination deeper into the soil than would

1 otherwise occur in the absence of that fluid?

2 A Well, in the absence of that fluid in this
3 scenario, there wouldn't be any VOC impact at that
4 location. So it's an all-or-nothing proposition, I
5 believe.

6 Q I want to focus on the known impact of
7 having water continuously infiltrate from a leak.

8 MR. SLOME: Can you stop the phone or something?

9 MR. MILLER: I turned it off before. I don't
10 know what --

11 Q What impact does continuously infiltrating
12 water or fluid from the surface have on driving VOCs
13 down through the subsurface?

14 A The available data indicates, as I said,
15 that there were low, a few tens of microgram per
16 liter of VOCs contained within the wastewater. Some
17 of the wastewater would have leaked from the
18 deteriorated drain line, based on the description
19 I've seen, and seeped into and through the soils.
20 That water predominantly would have moved downward
21 under the force of gravity and infiltrated into the
22 ground over a period of time carrying the VOCs with
23 it.

24 Q Isn't that source where you have water
25 driving it more likely to find its way to

1 groundwater?

2 A Than --

3 Q Than a source without continuous water
4 flowing from above?

5 A What type of source without continuous water
6 flowing from above?

7 Q We've already gone over two examples, a
8 leaking sump and a leaking sewer pipe. I want you to
9 focus on those.

10 A Both of those would involve VOCs dissolved
11 in water. You were comparing those to another type
12 of release, and I was trying to find out what other
13 type of release you wanted me to compare them to.

14 Q What I want to know is if a release where
15 VOCs are dissolved in water that is continuously
16 leaking from a sewer pipe are more likely to go down
17 through the soil and find their way to groundwater.

18 MR. SLOME: Than what?

19 MR. MILLER: Than VOCs released to the soil
20 without continuous water.

21 THE WITNESS: I suppose it depends on the
22 circumstances. If you had liquid VOCs, pure phase
23 solvent, that were being released under one
24 hypothetical at very high concentrations and high
25 volumes, that would present a much greater risk than

1 low levels of VOCs being released dissolved in
2 groundwater.

3 BY MR. MILLER:

4 Q Do the monitoring wells on the southern end
5 of the Y-1 building contain higher levels of VOCs
6 than the upgradient wells?

7 A When you are referring to monitoring wells
8 on the southern end of the Y-1 building, are you
9 talking about any well in particular or just any
10 monitoring well onsite that's to the south of the
11 building?

12 Q Any well that you consider to be appropriate
13 to determine if the release in the vicinity of the
14 ductile iron pipe that was deteriorated would have
15 reached and contaminated groundwater and compare it
16 to an upgradient sample to see if the concentration
17 appears to be elevated.

18 A The two wells --

19 Well, actually there's several wells located
20 downgradient of the drain line in question. That
21 would include the MW-1A, 1B series, MW-3, MW-4, MW-6,
22 MW-10 and MW-11.

23 Q Let's check MW-1. To my eye at least, it's
24 the closest to the iron ductile pipe and the
25 clarifier.

1 A Okay. That's a dual-stage well then. MW-1B
2 is screened within the upper portion of the shallow
3 aquifer between the depths of 117 and
4 132 feet. MW-1A is screened closer to the bottom of
5 the shallow aquifer between depths of 170 and
6 180 feet. The VOC levels measured in MW-1B
7 throughout the, roughly, four-year monitoring period
8 were relatively low, generally lower, generally much
9 lower than VOC levels that were measured in
10 upgradient wells.

11 Q What range?

12 A There's a maximum recorded DCE concentration
13 of 4 micrograms per liter, maximum recorded TCA
14 concentration -- and I'm reading these off the graph,
15 so --

16 MR. SLOME: Identify the document for him so
17 that he can -- for the record so he can do it for
18 himself also.

19 THE WITNESS: I'm looking at Figure A-2 out of
20 the 11-by-17 figure package for the EMD summary
21 report.

22 Maximum reported or recorded TCA
23 concentration was approximately 2.8 micrograms per
24 liter. The maximum recorded PCE concentration over
25 this four-year period was approximately

1 0.8 micrograms per liter, and the maximum recorded
2 TCE concentration over that four-year period was
3 approximately 0.7 micrograms per liter.

4 BY MR. MILLER:

5 Q There's a spike in the TCE concentration in
6 that monitoring well series?

7 A Yes. Actually right at the beginning. I'm
8 sorry. There was a value of 5 micrograms per liter
9 recorded in '87 and 7 for TCA right at the time that
10 the well was installed.

11 Q We're not on the same page.

12 Attachment A-1.

13 A Oh, I'm sorry. I was looking at the deep
14 screen.

15 Q Yes.

16 A I'm sorry. I was looking at the shallow
17 screen.

18 Q MW-1A in Attachment A-1 shows a PCE (sic)
19 concentration of 140 parts per billion, correct, in
20 groundwater?

21 A A-1. You said "P" as in Paul?

22 Q "T" as in Tom.

23 A Yes, for the deep screen. I was looking at
24 the shallow screen, which is closer to the area that
25 we're discussing in A-2.

1 Q MW-1A shows elevated concentrations of TCA
2 and DCE as well, correct?

3 A Yes.

4 Q Well above MCLs?

5 A Yes. Not for TCA, but for DCE and TCE.

6 Q TCA is in green and it's concentrations as
7 high as 70-plus parts per billion?

8 A Yes. About 72 in 19- -- July of '89.

9 Q Now, isn't that set of concentrations in
10 monitoring well 1A much higher than upgradient
11 sources? Let's just take the TCE example of
12 140 parts per billion. Which monitoring well was
13 most directly upgradient of MW-1A?

14 A There are a number of monitoring wells that
15 were installed upgradient of the site.

16 Q Are any of them directly to the north of
17 MW-1A?

18 A To the north wouldn't be upgradient.

19 Q What would upgradient be?

20 A To the east. There were three wells
21 installed to the east of the EMD site. That would be
22 AM-39, 39A, AM-40, 40A and AM-42, 42A.

23 Q Isn't MW-3 directly east of MW-1A?

24 A No.

25 Q Isn't it the most directly upgradient well

1 to the east of MW-1A?

2 A MW-3?

3 Q Yes.

4 A No.

5 Q Are you looking at Figure 10, the site plan
6 with all boring locations?

7 A No.

8 Q You will find MW-3 to the east of MW-1A in
9 the parking lot.

10 A No. It's to the south, almost due south.

11 Q North on this map is not to the top?

12 A No. There's a north arrow in the lower
13 righthand corner.

14 Q I see.

15 So we've got this map kind of laid on its
16 side if we put north to the top?

17 A Yes.

18 Q So what well did you say was directly to the
19 east, if any?

20 A I said there were three upgradient wells
21 that were installed to the east of the EMD site. I
22 named those wells, but none of those wells were in
23 existence in 1989.

24 Q And none of them are shown on your site map?

25 A Figure 10? They would be off the edge of

1 that map, upgradient.

2 Q Which one is most directly to the east?

3 A AM-40, 40A is probably going to be most
4 directly upgradient for, I would say, typical
5 groundwater conditions. But all three of those wells
6 at one point or another would be more or less
7 directly upgradient of MW-1.

8 Q The peak concentration in MW-1A in 1989 was
9 140 parts per billion. There's no data for MW --
10 AW -- I'm sorry, AM-40 in 1989, correct?

11 A Correct.

12 Q So which monitoring well was upgradient and
13 measured in 1989?

14 A I don't know that there were any monitoring
15 wells in existence upgradient in '89.

16 Q So you cannot say that the concentration
17 found in MW-1A was attributable to an upgradient
18 source; is that correct?

19 A Well, I think you can, yes.

20 Q Based on data several years later?

21 A Yes.

22 Q Isn't that a little more tenuous and
23 speculative than contemporaneous data?

24 A It would be better to have data during the
25 same time period if that were the alternative, yes.

1 Q Page 25 of Dr. Waddell's report -- and give
2 me the exhibit number, please, I can't recall.

3 MR. SLOME: 26.

4 MR. MILLER: 26?

5 THE WITNESS: 25.

6 MR. SLOME: Exhibit 26, page 25.

7 THE WITNESS: Got it.

8 BY MR. MILLER:

9 Q Yes.

10 In the first full paragraph he discusses the
11 concentrations measured in groundwater in the deeper
12 wells, about halfway down. Do you see that?

13 He states maximum concentrations of
14 1,1,1-TCA, 200 parts per billion; 1,1-DCE, 156 parts
15 per billion; TCE, as in Tom, 140 parts per billion;
16 and PCE, 30 parts per billion were found in the
17 deeper zone wells downgradient, correct?

18 A Yes.

19 Q And he states "It is notable that the
20 concentrations of 1,1,1-TCA were high compared to
21 those of 1,1-DCE in several wells indicating that the
22 source was not too far upgradient."

23 Do you see the statement?

24 A Yes.

25 Q Is it fair to say that if the ratio of TCA

1 to DCE shows more TCA than DCE, it's likely to be a
2 recent release close by and not one from an
3 upgradient source?

4 A No.

5 Q The ratio there, there's more TCA than DCE,
6 correct?

7 A Which well are we talking about?

8 Q I'm looking at the maximums listed in his
9 report. If you know the well, that's fine. Right
10 now I want to focus on the ratios.

11 A So 200 and 156?

12 Q Yes. There's more TCA than DCE.

13 A He's talking about the maximum reported
14 levels, not necessarily in the same wells.

15 But yes, he's saying the maximum reported
16 value for TCA was higher than the maximum reported
17 value for TCE.

18 Q And if we look at the data overall, there
19 was more TCA than DCE in most of the samples,
20 correct?

21 A No, not for the EMD site wells as a whole.

22 Q Have you done a comparison chart?

23 A Yes. I've plotted them side by side as a
24 function of time for all of the EMD wells.

25 Q Where?

1 A That's in Attachment A of the EMD report.

2 Q I'm looking at Attachment A-1, which is
3 MW-1A. Is that part of the series you are referring
4 to?

5 A Yes.

6 Q If we look at MW-1A, the concentration of
7 TCA is consistently higher than the concentration of
8 DCE throughout the period from 1988 through mid-1990,
9 a period of almost two years, correct?

10 A Yes. Or about half the monitoring time
11 available for that well. But that is actually one,
12 two, three data points, yes.

13 Q Later in time, which is what you would
14 expect after time passes, the DCE starts to increase
15 and the TCA is slightly lower, correct?

16 A I would say that's the overall trend with
17 some variability, yes.

18 Q Doesn't the data for MW-1A show that there
19 is consistently more TCA than DCE in this monitoring
20 well?

21 A No. Now, if we start off at the beginning
22 of the monitoring in 1987 and look at the general
23 trend, I would say there are similar levels of TCA
24 and DCE on average. For some of the monitoring
25 events, the TCA is higher. For some of the

1 monitoring events, the DCE is higher. But they're
2 similar up until the 1989 -- mid-1989 monitoring
3 event. And at that point, the TCA is roughly twice
4 the concentration of DCE for that monitoring event.
5 That's the largest disparity between the two. The
6 other sampling events, they are generally at similar
7 concentrations.

8 Q If we turn to MW-2, it also shows the
9 pattern of TCA being significantly higher than DCE in
10 mid-1988 through mid-1990 when the measured
11 concentration of DCE became higher for the first time
12 in that period, correct?

13 A No. I wouldn't agree with that.

14 There's one monitoring event in the middle
15 of 1989 where we again have a TCA concentration
16 that's higher than the DCE concentration. But other
17 than that, for most of the other monitoring events,
18 the DCE level is either above or similar to the TCA.

19 Q If we talk about a distant source of TCA, a
20 thousand or more feet upgradient, during the time the
21 TCA is in water moving over that thousand-foot
22 difference, wouldn't it tend to degrade into DCE?

23 A Some of it, yes.

24 Q Isn't that inconsistent with the data
25 Dr. Waddell describes at page 25 of his report?

1 A No.

2 Q Would you expect TCA to be higher than DCE
3 over a travel distance of -- TCA dissolved in
4 groundwater, of 1000 feet or more?

5 A Yes. At the groundwater velocities that are
6 present in the vicinity of the EMD site, yes,
7 assuming that the release originated as TCA.

8 (Whereupon Mr. Geocaris entered
9 the proceedings.)

10 BY MR. MILLER:

11 Q You have groundwater velocities in the area
12 that we're discussing at 4.5 feet per day, correct?

13 A That's what was simulated in the Y-12 model,
14 yes.

15 Q How long would it take to go 1000 feet at
16 that velocity?

17 A 7.3 months.

18 Q And for the Crucible site, that's two miles
19 upgradient approximately?

20 A It's not that far. If we're talking round
21 numbers, I would say 5000 feet; so that would be
22 three years.

23 Q And you are claiming over a three-year
24 period the TCA would not degrade into DCE so that DCE
25 concentrations would be higher than TCA?

1 A Over a three-year period, based on the
2 Gunther and Murphy data that we talked about
3 yesterday, if you started with pure TCA, you would
4 expect the TCA to be present at about three times the
5 DCE ratio.

6 Q Doesn't that include a component of travel
7 in the soil, or is that calculation all in
8 groundwater?

9 A It depends on the release mechanism. If TCA
10 was being released dissolved in wastewater, such as
11 we talked about for the sewer line, wastewater line a
12 few minutes ago, then the clock would start running
13 at the time the TCA became dissolved in the
14 wastewater and it would include the infiltration time
15 as well.

16 If TCA was being released as a pure product
17 or in a vapor phase where the vapor was the source of
18 the groundwater contamination, then the clock --
19 degradation clock wouldn't start running until the
20 groundwater contamination actually occurred, in which
21 case the degradation time and the travel times would
22 be very similar.

23 Q So Gunther's calculation is based on the
24 assumption that the TCA clock starts when it comes in
25 contact with water?

1 A Yes.

2 Q Regardless of where it is in the subsurface?

3 A Regardless of where it is, period.

4 Q So do you disagree with Dr. Waddell's
5 opinion that the TCA would have degraded to DCE
6 because of the greater travel time that a distant
7 source would have required?

8 A Yes. The data is not consistent with that
9 opinion.

10 Q Including, for example, the findings in
11 MW-1A in 1989?

12 A Yes.

13 Q Did you check monitoring well measurements
14 of the TCA/DCE ratio between the Crucible site and
15 the EMD site to see if it's consistent with your
16 opinion?

17 A Yes.

18 Q And where do you compare that on these
19 charts?

20 A We get to upgradient wells of the EMD site
21 beginning with Figure A-15 in the same package.

22 Q Let's just take one before we go there.
23 MW-5, Attachment A-6.

24 A Yes.

25 Q Every measurement there shows TCA higher

1 than DCE with a single exception at the end of 1990.

2 A Yes.

3 Q So the pattern there is TCA dominates and
4 DCE is in a lesser concentration consistently?

5 A Both are at low concentrations, yes. But
6 for MW-5, that is true.

7 Q All right. Now, where do we go for the
8 comparison with upgradient wells?

9 A Starting at Figure A-15 --

10 Q Is this again a series of figures?

11 A It's a continuation of the same series of
12 figures where the VOC levels, the measured VOC
13 levels, are plotted for each individual well.

14 Q A-39 you say is upgradient?

15 A Yes.

16 Q And this plot shows that the DCE
17 concentration upgradient of the EMD site is
18 consistently higher than the TCA concentration?

19 A Yes.

20 Q In every sample over a period between 1993
21 and 2011?

22 A Yes.

23 Q So that upgradient source had a higher
24 concentration of DCE than TCA consistently?

25 A No. The source isn't AM-39. The source is

1 located upgradient some distance of AM-39.

2 Q Right.

3 But the upgradient water consistently
4 contains more DCE than TCA in every single sample
5 over a period of more than a decade.

6 A Yes. We're looking at a well with data that
7 is later in time than what we're looking at for the
8 EMD wells.

9 Q AM-39A, every measurement of DCE over a
10 period of more than a decade is higher than TCA?

11 A Yes.

12 Q Isn't that inconsistent with your opinion
13 that despite the travel distance in time, you would
14 expect the DCE to be lower than TCA?

15 A No. I think it depends at what point you
16 are looking in time. If you are looking at a point
17 shortly after the release occurred, then you are
18 going to see a higher proportion of TCA to DCE.

19 If you continue to monitor after the release
20 occurred, then progressively the DCE concentrations
21 are going to get higher and the TCA is going to get
22 lower.

23 Q But that's consistent with Dr. Waddell's
24 opinion?

25 A His opinion was that the TCA-to-DCE ratios

1 at the EMD site were indicative of an onsite source
2 because they indicated a release time that was
3 insufficient in age for contamination to have
4 originated from a known upgradient source.

5 Q Well, let's try it this way.

6 The concentration ratios of TCA and DCE
7 found in downgradient wells at EMD are consistent
8 with a recent release and inconsistent with an older
9 release, correct?

10 A It depends what you mean by "recent." If
11 you are -- by "recent" you mean something that's,
12 say, five years old, okay, there is data, TCA-to-DCE
13 ratio data, that's suggestive of a considerable
14 portion of that contamination being on the order of
15 five years old. That doesn't eliminate an upgradient
16 source. In fact, that is very close, if not exactly
17 what one would expect as a travel time from the
18 upgradient source that he's identified at Crucible,
19 and it's inconsistent, entirely inconsistent, with
20 the age of the contamination that one would expect to
21 see if it was originating at EMD. It should be much
22 younger than five years.

23 Q Even at 170 to 180 feet below the surface,
24 doesn't it take time to get to that depth?

25 A I don't know that it would ever get to that

1 depth at EMD. It would --

2 If we're talking about a hypothetical
3 release of TCA at EMD, it would reach, obviously,
4 first the surface of the aquifer and impact the upper
5 portion of the shallow aquifer where you would see it
6 in the onsite wells within the shallow zone. You
7 wouldn't necessarily even see it in the deeper
8 screened wells because it would be carried
9 downgradient.

10 Q What is the time of the Crucible release of
11 TCA?

12 MR. SLOME: I'm not sure I understand the
13 question.

14 BY MR. MILLER:

15 Q When did Crucible release TCA to the
16 environment?

17 A I would have to look at that file. They
18 closed, I believe, back -- in round numbers, in
19 approximately 1980; so roughly 30 years ago. So it
20 would have --

21 The original release obviously would have
22 predated that. There's data that indicates that
23 there is a continuing release of TCA, in the form of
24 TCA to this date, which suggests there was a very
25 significant release of TCA at that site in the past

1 that is only now making it -- some portions of it to
2 groundwater.

3 Q That's inconsistent with your opinion, isn't
4 it?

5 A I'm not sure what you are asking.

6 Q If the last time -- if all of the release of
7 TCA at the Crucible site occurred on their last day
8 of business, the release would be at least nine years
9 old before it was picked up at the EMD site and,
10 therefore, the concentration ratio would have had
11 more DCE than TCA, according to your computations.

12 A Where does the nine years come from?

13 Q 1980 to 1989. 1989 is when it was measured
14 in 1990 in the EMD wells that we've been discussing.

15 A Oh, there's still TCA in TCA form that
16 hasn't been converted that's being dissolved in the
17 groundwater at the Crucible site.

18 So under your hypothetical, all of the
19 release -- all of the VOCs released in 1980 would
20 have not only been released but immediately been
21 flushed to and dissolved in the groundwater. That's
22 not the case.

23 There is a continuing release of TCA at that
24 site -- TCA that has not previously been exposed to
25 groundwater. There's only two forms that that could

1 have occurred in.

2 Q How can you claim that between 1980 and 1989
3 the contact between TCA and water was delayed for at
4 least five years?

5 A It was delayed for more than 30 years in
6 some cases in that there's a continuing release of
7 TCA at that site.

8 Q Today?

9 A Yes.

10 Q Most of that TCA has been converted to DCE
11 long before the 30th year.

12 A Most, yes. The only way you can still have
13 TCA at that site today, the TCA that's been
14 documented, is if you had a release of phase
15 separated pure solvent at that site that did not come
16 into contact with groundwater initially and has taken
17 years for portions of that release to become
18 dissolved in groundwater. That could be the result
19 of solvent that's contained within the soil that
20 hasn't been exposed to groundwater, or it could be
21 the result of DNAPL that is present within a
22 groundwater zone where the core of the DNAPL has not
23 been exposed to groundwater.

24 Q Have you looked at the data at the Crucible
25 site and downgradient of the Crucible site?

1 A The groundwater data?

2 Q Yes.

3 A Yes.

4 Q You looked at the ratio of TCA to DCE in
5 those groundwater samples between 1980 to the extent
6 data are available in 1989?

7 A Yes.

8 Q And where do you show that in these charts?

9 A Well, there's the data for the three
10 upgradient wells we've been discussing that are in
11 these charts.

12 Q I want something closer to Crucible.

13 A MW-23.

14 Q Is it within 500 feet of Crucible?

15 A No.

16 Q Is there a monitoring well within 500 feet
17 of Crucible? So we're looking exclusively at
18 Crucible and not some additional source potentially
19 being present.

20 MR. SLOME: Your question is what is the nearest
21 downgradient well to Crucible?

22 MR. MILLER: Yes. It will give us meaningful
23 data on the TCA/DCE ratios.

24 THE WITNESS: I believe that is the closest
25 downgradient well, with the exception of looks like

1 Hydropunch samples that were collected in 2011, which
2 would give you a snapshot.

3 BY MR. MILLER:

4 Q And what was the monitoring well that's the
5 closest?

6 A MW-23.

7 Q And how far away is it from the site?

8 A Approximately 950 feet.

9 Q So where's the data on MW-23?

10 A That is contained in the VOC well graph
11 package.

12 Q Well, let's look at C-1 first within the EMD
13 site assessment summary attachments.

14 A Yes.

15 Q These are average concentrations for
16 upgradient wells?

17 A Well, there's a couple different things that
18 are shown here.

19 The red thick line for the figure we're
20 looking at -- all of this is for PCE. The thick red
21 line shows the average PCE concentration measured as
22 a function of time in the three upgradient wells of
23 EMD, and those three wells are shown in the inset
24 figure in the lower left corner.

25 The shaded orange shown with the peaks and

1 valleys shows the maximum and minimum measured PCE
2 levels in those same wells over the period of time
3 between 1989 and 2011.

4 And then the concentrations measured in the
5 downgradient wells, the wells downgradient of EMD are
6 shown by the orange, green and red squares that are
7 plotted.

8 Q Okay. So go to Attachment C-3.

9 A This is the same format graph, but it's for
10 a combined TCA/DCE concentration.

11 Q It doesn't have them separate?

12 A The upgradient wells separate?

13 Q No.

14 It doesn't separate the TCA concentrations
15 from the DCE concentrations.

16 A It doesn't because that makes the graph more
17 difficult to interpret because the TCA is being
18 degraded into DCE. So you can't make a direct
19 comparison between an upgradient and a downgradient
20 well unless you convert everything into an equivalent
21 TCA concentration, which is what has been done here.

22 Q So you can't check TCA/DCE ratios on this
23 chart either?

24 A No. Everything's been converted into TCA on
25 Figure C-3.

1 Q Okay. So where do I go for MW-23?

2 MR. SLOME: Can we do -- can we have a break and
3 do that after the break?

4 MR. MILLER: I would like to see where it is
5 first, then we can take a break.

6 MR. SLOME: Okay.

7 THE WITNESS: In the VOC well graphs.

8 BY MR. MILLER:

9 Q Could you show me what the cover of that
10 looks like?

11 A Certainly.

12 Q Is this EMD?

13 A This is all of the OCWD data and some PRP
14 data.

15 Q Okay. You didn't give that to me yesterday,
16 correct?

17 A I only brought one copy with me, but we've
18 uploaded it.

19 Q It's dated March 2012, correct?

20 A Yes.

21 Q And you didn't give it to me yesterday?

22 A I showed you this hard copy yesterday.

23 Q You didn't give me a copy yesterday,
24 correct? I don't recall you showing it to me,
25 frankly.

1 Do you have another copy?

2 A No. You can use this one if you would like.

3 This was stacked with the documents out in
4 the middle of the table when we went through what I
5 brought.

6 Q I don't believe it was. I'm not quarreling
7 with you. I just don't remember it that way. That's
8 all I'm saying.

9 I need to see it now. If you would pull
10 that page out, I would appreciate it. We can take
11 the break, and I will look at it.

12 MR. SLOME: Okay. Are we going off the record?

13 THE VIDEOGRAPHER: We're going off the record.
14 The time is 10:27.

15 (Off the record.)

16 THE VIDEOGRAPHER: This now begins disk
17 number 2, Volume 2, in the deposition of Glenn
18 Tofani. We are now back on the record. The time is
19 10:39.

20 BY MR. MILLER:

21 Q Just before the break you referred me to a
22 document entitled "Historical Contaminant
23 Concentration Graphs with Groundwater Elevations,
24 1957 to 2011 data." And the page within it that
25 concerns MW-23 --

1 I don't see a page numbering system. Let me
2 hand that to you.

3 That's the document you referred me to; is
4 that correct?

5 A Yes.

6 MR. MILLER: For the record, we don't have an
7 extra copy. The witness has the only available copy
8 today, although I understand it was posted to the FTP
9 site.

10 Q That dataset begins in what year?

11 A 1998.

12 Q And in 1998, and for at least a decade
13 thereafter, every single measurement shows DCE
14 concentrations were higher than TCA during the same
15 sampling event, correct?

16 A There's one location where it looks like TCA
17 wasn't analyzed for in the DCE plots below the TCA
18 line, so I would tend not to count that. So with
19 that notation, yes, correct.

20 Q Is that consistent with your theory that
21 Crucible is a source of continuing new releases of
22 TCA to groundwater and that the ratio of TCA to DCE
23 would be consistently one where the TCA was higher?

24 MR. SLOME: Objection; compound.

25 THE WITNESS: I think, yes, to part A. And to

1 part B, that doesn't correctly reflect my opinion.

2 BY MR. MILLER:

3 Q To the extent that Crucible is an upgradient
4 source of any DCE coming onto the EMD property, this
5 document suggests that you would have more DCE than
6 TCA from that source.

7 A At which point in time?

8 Q During the entire period for which we have
9 data.

10 A For this well which would include 1998
11 through the present, yes.

12 Q And you told me just a while ago that you
13 believe there are continuing releases of TCA to the
14 groundwater at Crucible.

15 A Yes.

16 Q So whatever is being released to the
17 groundwater at Crucible quickly converts to DCE long
18 before it gets to Northrop.

19 MR. SLOME: Objection; no foundation.

20 THE WITNESS: No.

21 BY MR. MILLER:

22 Q What is wrong with that statement, in view
23 of the fact that DCE concentrations are consistently
24 higher than TCA throughout that measured period?

25 A This -- well, if you look at its location

1 that's shown on this figure, it's not located
2 directly downgradient of Crucible. It's located
3 somewhat to the south. And what is being picked up
4 in MW-23, which was installed as part of the
5 AC Products investigation, is the perimeter, or the
6 periphery, if you will, of the plume, the DCE/TCA
7 dioxin plume, it's emanating from Crucible.

8 If you look at recent data that was
9 collected directly downgradient of Crucible, you see
10 continuing TCA releases at what I would call the
11 heart of the plume. Whereas the data that's
12 reflected by MW-23 at the periphery, most, if not all
13 of the TCA has been converted to DCE at this
14 location.

15 Q All of the data at MW-23 demonstrate that
16 within 1000 foot travel distance from Crucible
17 Materials, the ratio of DCE starts to exceed the
18 concentration of TCA in the same monitoring period,
19 correct?

20 A For the period that's covered by this data
21 at this well location.

22 Q And the Hydropunch data demonstrated to you,
23 at least, that TCA is being continuously released to
24 the groundwater at Crucible Materials to this day?

25 A Yes.

1 Q So although I recognize that MW-23 is
2 somewhat to the south of a portion of the building,
3 isn't the presence of TCA and DCE at MW-23 most
4 likely attributable to the Crucible release, given
5 the concentration and location?

6 A Yes.

7 Q So that tells us that in less than
8 1000 feet the DCE would predominate and the TCA would
9 be lower?

10 A At this location roughly beginning 15 years
11 after the close of operations at that site, yes.

12 Q What scientific data do you have that it was
13 any different at an earlier period of time?

14 A If you compare the data at this location, we
15 see that the TCA was effectively down or very close
16 to the detection limit by 2008. There's no
17 additional TCA that's picked up at this well
18 subsequent to that time.

19 But if we look at the 2011 monitoring
20 results where samples were collected directly
21 downgradient, we still see TCA at that location,
22 closer to the source, more directly downgradient of
23 the source, which is consistent with a very
24 significant and ongoing release at that location but
25 it's still contributing TCA to groundwater.

1 Q I'm trying to find out what scientific or
2 measured data you have to base any claim on that the
3 Crucible release of TCA to groundwater won't convert
4 to a predominantly DCE concentration within
5 1000 feet or so of the site. Is there any such data?

6 A Yes.

7 Q What?

8 A If you consider the groundwater travel times
9 that we've been discussing, number 1, and the number
10 that you asked me about earlier was the I believe
11 four-and-a-half feet per day, which yielded an
12 effective groundwater velocity of 1642 feet per year,
13 if you were to take that number, look at the distance
14 that the Crucible site is upgradient of EMD,
15 5000 feet, if I were to apply that travel time to
16 that distance, it gives me an effective travel time
17 of three years.

18 If we assume that there was a release of TCA
19 at the Crucible site and all of the data indicates
20 that there not only was a release of TCA at the
21 Crucible site, that it was a large and prolonged
22 release to the extent where it's still occurring
23 almost 30 years after the close of that operation,
24 still occurring today, if you had TCA entering the
25 groundwater at Crucible in the past at higher

1 concentrations, migrating downgradient over a
2 three-year period, you would expect to see TCA-to-DCE
3 ratios at the EMD site on the order of three. The
4 TCA concentration still three times higher than the
5 DCE concentration by the time that groundwater
6 migrated to the EMD site.

7 MR. SLOME: Indicate what document you are
8 using.

9 THE WITNESS: I'm looking at Exhibit 14.

10 BY MR. MILLER:

11 Q You don't have any measured data three times
12 higher.

13 A The typical concentration ratio you see at
14 EMD is older than this, so this is what --

15 Q Do you have any data arriving at EMD where
16 the TCA is three times higher than DCE?

17 A I can look, but I would not necessarily
18 expect to see that.

19 There's going to be some data that falls
20 within that range, yes.

21 Q Most of it doesn't.

22 A Most of it indicates older TCA than three
23 years. In fact, almost all of it indicates older TCA
24 than three years.

25 Q Can I mark this map?

1 A Sure.

2 Q I assume you will generate a large number of
3 identical copies if you need to.

4 Exhibit 28.

5 (Plaintiff's Exhibit 28 was
6 marked for identification and is
7 attached hereto.)

8 MR. SLOME: This is the only copy?

9 THE WITNESS: Yes.

10 MR. SLOME: This is another document that you
11 brought here yesterday for which there was only one?

12 THE WITNESS: No, I did not bring this
13 yesterday.

14 BY MR. MILLER:

15 Q Exhibit 28 shows a distance between Crucible
16 Materials and AM-40 of 4,673 feet, and you have a
17 direction of flow arrow that indicates that you would
18 expect the flow from Crucible to arrive at that
19 location, correct?

20 A Yes.

21 MR. ELIE: Can we get an indication what the map
22 is?

23 MR. SLOME: Just describe it for the record.

24 THE WITNESS: It has a title on this 11-by-17
25 figure, it says "Site Plan for EMD Vicinity." It

1 shows the limits of the former EMD site, as well as
2 the well locations on the EMD site and downgradient
3 well locations FM-7, FM-1, FM-24 and upgradient well
4 locations MW-23 and FM-3. And it also shows the
5 location of the Crucible Materials site.

6 MR. ELIE: Thank you.

7 MR. MILLER: All right. I marked a document
8 called "Measured Concentrations in Groundwater" that
9 was prepared by Dr. Waddell as Exhibit 28.

10 Q Do you have that in front of you?

11 MR. SLOME: 27 you mean.

12 MR. MILLER: Well, then, we're missing 28.

13 THE REPORTER: 27, 28 is the map.

14 MR. MILLER: Oh, I'm sorry. Exhibit 27.

15 (Plaintiff's Exhibit 27 was
16 marked for identification and is
17 attached hereto.)

18 BY MR. MILLER:

19 Q Do you have it?

20 A Yes. My copy has the sticker on it.

21 MR. SLOME: Yes, you got the original.

22 BY MR. MILLER:

23 Q All right. Does this have the data for
24 AM-40 under the heading "Orange County Water
25 District," or would we look somewhere else?

1 A It does have the data for AM-40. It looks
2 like it begins on page 164.

3 Q There's a series of AM-40s. There's
4 AM-40/1, AM-40A/1. What do you understand those
5 designations to represent? Are there multiple
6 sampling points at that location?

7 A Yes. I believe there's two.

8 AM-40 is a deep screen, screen between 175
9 to 190 feet below the ground surface, which would be
10 near or in the lower portion of the shallow aquifer.

11 And then AM-40A is the upper screen at that
12 location between a depth of 145 and 165 feet, which
13 would be near the middle of the shallow aquifer. I
14 don't believe there's any significance to the "1."

15 Q Okay. And the data go back to 1993 for that
16 monitoring well?

17 A Yes.

18 Q So there's no data from that monitoring
19 well, for example, that covers any period prior to
20 1993?

21 A Correct.

22 Q I'm looking at the column labeled "TCA" and
23 the column labeled "1,1-DCE" for AM-40, and do you
24 believe this represents at least a partial
25 contribution from Crucible, this dataset?

1 A Yes.

2 Q And doesn't this consistently show that the
3 concentration of TCA is lower than DCE?

4 A Yes.

5 Q Which is inconsistent with your theory?

6 A No. No. The concentration of TCA to DCE is
7 going to vary both in space and time.

8 Q Well, if your theory is correct, wouldn't
9 the TCA be higher some of the time than DCE if it's
10 going to reach EMD in a ratio where DCE is lower than
11 TCA?

12 A If you add data from AM-40 that went back
13 further in time, you would see higher TCA-to-DCE
14 ratios at AM-40.

15 Q You claim that, but there's no scientific
16 measurement to show it.

17 A What you see in the data that is available
18 for AM-40 are consistently dropping TCA-to-DCE ratios
19 for the 15-plus years that data is available. A
20 trend is apparent in AM-40. It's obvious that if you
21 continue to go back closer to the point when the
22 release initiated, you are going to see progressively
23 higher TCA-to-DCE ratios.

24 Q I'm looking at the first measurement in
25 AM-40 in April 1993.

1 MR. SLOME: On page?

2 MR. MILLER: 164.

3 Q Concentration of TCA is 4.2, concentration
4 of DCE is 14.1. So the DCE is significantly higher
5 than TCA.

6 A For the initial monitoring event, yes. And
7 it remains higher for the subsequent monitoring
8 events at this time.

9 Q Instead of having TCA be three times higher
10 than DCE, we have the reverse. DCE is three times
11 higher than TCA, more or less?

12 A Yes.

13 Q And you believe that change from three times
14 more TCA than DCE to three times more of DCE than TCA
15 occurred in a period of two, three years?

16 A No. No. No, I think to get to the point
17 where you had TCA that's going to be a multiple of
18 the DCE concentration, you would have to go back to
19 the time when the TCA release originally occurred at
20 Crucible.

21 Subsequent to that, you are going to have
22 TCA that's already degraded to DCE, and you are going
23 to have consistently higher DCE-to-TCA ratios.

24 Q So when did the release of TCA occur at
25 Crucible?

1 A I don't know, other than it, I believe, can
2 be safely assumed that the initial release occurred
3 before they terminated their operations.

4 MR. MILLER: Let me show you Exhibit 29.

5 (Plaintiff's Exhibit 29 was
6 marked for identification and is
7 attached hereto.)

8 BY MR. MILLER:

9 Q This is Dr. Waddell's comprehensive report
10 as opposed to a site-specific report.

11 You are familiar with it?

12 A Yes.

13 Q And at what page does the discussion of
14 Crucible begin?

15 A 70.

16 Q Does this help refresh your memory on when
17 and how the release occurred at Crucible?

18 A It identifies the cessation of operations at
19 that facility as 1984. I do recall what his
20 interpretation was of the source of TCA at that
21 facility was.

22 Q What was the source?

23 A He referred to TCA leaking through the
24 bottom of an unlined vapor degreaser at that
25 facility.

1 Q Do you disagree with that?

2 A I don't know what the source was.

3 Q He does report in the '70s solvent vapors
4 caused a fire because they were released --

5 MR. SLOME: What page are you on?

6 BY MR. MILLER:

7 Q -- from containment.

8 Page 71, midway down.

9 And the water sprinklers went off?

10 A Yes.

11 Q That's likely to cause some environmental
12 contamination with TCA?

13 A It has the potential, yes.

14 Q He reports that in December 1984, the
15 southern property line had a TCA concentration of
16 780,000 parts per billion and PCE of 21,000 parts per
17 billion and TCE, as in Tom, with 70,000 parts per
18 billion.

19 A Yes.

20 Q So if the source is Crucible, wouldn't you
21 expect to find not just TCA but also TCE and PCE?

22 A Potentially. But I don't believe they were
23 necessarily all released as part of the same event.
24 So it would depend upon the timing and the mass of
25 each of those contaminants that was released.

1 Q Was 1,4-dioxane released at Crucible?

2 A There appear to be --

3 Well, there are very high concentrations of
4 1,4-dioxane that have been detected recently, I
5 believe in 2011, in the perched zone just
6 downgradient of Crucible. So it appears that
7 1,4-dioxane was released in conjunction with the TCA
8 at Crucible.

9 Q And somehow it left the property but was
10 still in the perched zone?

11 MR. SLOME: Objection; argumentative.

12 THE WITNESS: The Dioxane?

13 BY MR. MILLER:

14 Q Yes.

15 A That appears to be the case.

16 Q That can happen, right? You can have
17 solvents released to the environment that stay in the
18 perched zone and travel away from the point of
19 release to another property?

20 A It depends on the characteristics of the
21 perched groundwater zone. If there is a laterally
22 extensive perched groundwater zone that is moving, it
23 can happen.

24 Q And there are other sites in the project
25 area where it's known that solvents released to the

1 subsurface have moved to the east more than 1000 feet
2 before they made their way down to groundwater and
3 then started moving in a different direction.

4 A I'm not familiar with those sites. That's
5 been alleged by Dr. Waddell to have occurred at EMD,
6 I'm sure you are aware.

7 Q Yes.

8 And did you check to see what site data he
9 had at other locations to support that?

10 A I saw the references he had to, I believe,
11 two other sites where he believed that has occurred.
12 I don't recall him referencing migration distances of
13 1000 feet for those sites.

14 Q Well, let's just ask ourselves -- well,
15 strike that.

16 Did you check the data for the sites he
17 relied on to support that opinion?

18 A No.

19 Q You don't disagree with it, you don't agree
20 with it? You have no position?

21 A I don't think it's relevant to the EMD site.

22 Q But in terms of the potential in the project
23 area for contaminants released to the soil to move
24 within the vadose zone laterally for significant
25 distances as described by Dr. Waddell, you don't have

1 any data to disagree with him, correct?

2 A Well, if we're talking about migration
3 within the perched zone, then technically we're not
4 within the vadose zone.

5 You are referring to the perched zone?

6 Q We can use the perched zone for this
7 purpose.

8 A I think the migration of groundwater within
9 a perched zone in a direction that's contradictory to
10 the normal regional flow and topography is possible
11 but rare.

12 Q If we know it's occurred at two sites, why
13 would it be rare?

14 A It is rare. It does not occur very often.
15 Typically perched groundwater flow will mimic
16 regional flow and topography.

17 Q But Dr. Waddell cited two examples where it
18 didn't mimic the regional flow, it went in the
19 opposite direction, correct?

20 A He cited two samples where he believes it
21 went in the opposite direction, yes.

22 Q And you don't have any basis for disagreeing
23 with that?

24 A Other than what I just said, that it's rare.
25 I'm not saying it didn't happen at those two sites.

1 All I'm saying is to the extent it did happen at
2 those two sites, that would be the exception rather
3 than the rule.

4 Q If you look at Page 73 of Dr. Waddell's
5 discussion, he discusses MW-23 in the second
6 paragraph, correct?

7 A Yes. Yes.

8 Q And he says that "The compositions of COCs
9 in this well in recent years are very similar to
10 those in the borings that OCWD installed west of the
11 building."

12 Do you agree with that?

13 A That's consistent with my recollection.

14 Q Which is another indication that MW-23 is
15 contaminated by releases occurring at Crucible?

16 A Yes. It's an indication, yes.

17 Q And you believe MW-23 is contaminated by
18 Crucible releases, correct?

19 A Yes.

20 Q And you believe the same is true for AM-40,
21 correct?

22 A Yes.

23 Q At Crucible was there a release of pure TCA
24 or something else?

25 A It's evident based on the continuing

1 presence of TCA, again roughly 30 years after the
2 close of that facility, that it was not released
3 exclusively in dissolved form, that there had to have
4 been a release of pure TCA through some mechanism.

5 Q Is it fair to say that there's no known
6 release of pure DCE at the Crucible site?

7 A Yes.

8 Q Have you compared detections in MW-1A after
9 1993 to the ratios of TCA and DCE in any upgradient
10 well?

11 MR. SLOME: Can I hear that question back?

12 MR. MILLER: I'll start over again.

13 MR. SLOME: Okay.

14 BY MR. MILLER:

15 Q With respect to the Y-12 building we went
16 over MW-1A, which is located close to the area where
17 there was a clarifier.

18 A The Y-1 building?

19 Q Yes.

20 Do you have data at that location after
21 1993?

22 A Yes, although I suspect not the type of data
23 that you may be looking for.

24 Q Groundwater data?

25 A Yes. From the recent, is it 2010 sampling

1 Hydropunch at that location?

2 Q MW-1 was destroyed when?

3 A It looks like in very late 1990 or early
4 '91.

5 Q It was destroyed by Northrop?

6 A Yes, in conjunction with the site closure
7 activities.

8 Q So there's no way to directly compare the
9 1993 data in AM-40 to MW-1, correct?

10 A Correct. They don't overlap with respect to
11 time.

12 In response to your earlier question, there
13 was a groundwater sample collected in 2010 at the
14 location of the anodic room sump. The 2010 sampling
15 locations are shown in Figure 9 of the EMD summary
16 report, Exhibit 24.

17 Q So if we take the groundwater data report,
18 Exhibit 27, from Dr. Waddell, I would like to compare
19 the data for AM-40 to the samples taken closest to
20 MW-1 in 2010.

21 So let's get AM-40 in a period close to
22 2010. What page would that appear at?

23 A You are asking about AM-40?

24 Q Yes.

25 A It's the same page we were on before, but

1 I've lost track of what that was. Looks like 165.

2 Q And the entries for 2010 sampling would be
3 on page 166?

4 A For AM-40A, yes.

5 Q And throughout 2010 it's non-detect for TCA,
6 and the levels of DCE ranged from 5.4 to 4.2,
7 correct?

8 A Yes.

9 Q So now let's go to the boring that you say
10 is close to the location of MW-1A. What is the
11 boring number?

12 A GW-01.

13 Q And what page do we go to for that?

14 A I've got that data summarized in the summary
15 report for the EMD site, Exhibit 24. I can try and
16 find it in Exhibit 27 as well, if you would prefer to
17 refer to that.

18 Q At least I could follow along if you used
19 Exhibit 27.

20 On page 221 I see data for GW-1 and 2.

21 A 221?

22 Q Yes. I see some other GWs, but they are
23 labeled "MA."

24 A Where I would expect to find it is on
25 page 70 with the EMD data. I don't see it there.

1 Q All right. Where do you have it summarized?

2 A It's Table 6 of Exhibit 24.

3 Q This one?

4 A Yes.

5 Q Table 6 is labeled "2010 Groundwater Testing
6 Results"?

7 A Yes.

8 Q So these are grab samples?

9 A Yes.

10 (Whereupon Mr. Geocaris exited
11 the proceedings.)

12 BY MR. MILLER:

13 Q At GW-1 in 2010 all of the measurements are
14 non-detect for TCA but DCE is present.

15 A Correct.

16 Q Highest concentration, 2.1 during that time
17 period, correct?

18 A Yes.

19 Q But it shows higher detections of DCE at
20 GW-2 and non-detect for TCA.

21 A Correct.

22 Q How do you compare those sample results in
23 2010?

24 MR. SLOME: To?

25 BY MR. MILLER:

1 Q To the upgradient sampling results at
2 AW-40 -- or AM-40. Which is it?

3 A AM.

4 I'm looking at the graph for AM-40A, which
5 is in the VOC historic plots, and in February of 2010
6 we've got a DCE concentration of approximately 4 or
7 5 micrograms per liter, but in order to make a more
8 direct and accurate comparison, the groundwater that
9 was being sampled at the EMD site in March of 2010,
10 in round numbers if we use the travel times we were
11 discussing before, would have been groundwater
12 roughly that would have been at AM-40 in March of
13 2009 and there at that point in time we had
14 concentrations on the order of 9 or 10 micrograms per
15 liter for DCE.

16 Q And TCA?

17 A TCA, approximately 5.

18 I'm sorry, did you say TCE or TCA?

19 Q TCA --

20 A I'm sorry.

21 Q -- as in apple.

22 A Non-detect for TCA.

23 Q Let's return to your summary report.

24 Can I have the exhibit number just so the
25 record's clear, please?

1 A 24.

2 Q Thank you.

3 Page 8. In the first paragraph you state
4 the highest TCA concentration 6300 parts per billion
5 was measured in a sample collected beneath the
6 location of the former vapor degreaser.

7 MR. SLOME: I'm sorry. On page 8?

8 MR. MILLER: Yes.

9 THE WITNESS: Yes.

10 BY MR. MILLER:

11 Q They also excavated 600 tons of VOC-impacted
12 soil in that area, correct?

13 A That was site wide, not necessarily at that
14 location.

15 Q But it certainly included the soil at that
16 location?

17 A Yes, although there was a larger, more
18 extensive excavation at that location that's
19 described later in this report.

20 Q In the next paragraph you report that a more
21 extensive soil contamination was identified beneath
22 the Y-1 anodic room in the area of the former vapor
23 degreaser during the March 1991 demolition work,
24 correct?

25 A Yes.

1 Q And at that time, they found TCA at
2 13,000 parts per billion and TCE at 58,200 parts per
3 billion, correct?

4 A Yes. Maximum concentrations.

5 Q Did that release contaminate groundwater?

6 A If it did, it's not evident from the
7 available data. So to the extent it did, I would say
8 it did not significantly contaminate groundwater.

9 Q How do you square that with the Regional
10 Board's position that the concentrations of TCA and
11 TCE are consistently higher downgradient of the EMD
12 site than upgradient?

13 MR. SLOME: Objection; no foundation.

14 THE WITNESS: I think ultimately --

15 And I don't recall which reference you are
16 citing, but I think ultimately the Water Board
17 decided that they were not and that the site -- the
18 EMD site did not appear to be a significant source of
19 groundwater contamination.

20 BY MR. MILLER:

21 Q Is that your position?

22 A That's my recollection of the Water Board's
23 position and --

24 Q What is your position?

25 A That the EMD site historically has not been

1 a significant source of groundwater contamination and
2 that it is not a significant source of contamination
3 today.

4 Q Are there groundwater samples for DCE that
5 were taken at the EMD site?

6 A Yes.

7 Q Where did you put that data in your report?

8 A It's summarized in the graphs that we have
9 been going over, through, for the last few hours.

10 Q Doesn't that show elevated levels of TCA and
11 DCE in groundwater at the site?

12 A Yes.

13 Q And downgradient of the site?

14 A Yes, and upgradient of the site.

15 Q The downgradient concentrations of DCE are
16 consistently higher than upgradient, correct?

17 A No. I've done that comparison in one of the
18 figures that we looked at a few minutes ago, and they
19 are not.

20 Q Isn't it a fact that just after the
21 excavation there were groundwater samples that show
22 DCE in the range of 50 to 60 parts per billion in
23 numerous samples?

24 A From the monitoring wells?

25 Q From samples taken shortly after the

1 excavation of groundwater.

2 A And you are talking about the excavation
3 that you just previously referenced or the large --
4 larger excavation?

5 Q I don't recall which of the two, but I
6 recall it was after the excavation.

7 A There's a DCE concentration that was
8 measured approximately 63 micrograms per liter in
9 November of 1991 in MW-9, and that would have been
10 just after actually both excavations.

11 Q And is that downgradient?

12 A No. That's upgradient.

13 Q Is it on Northrop's property?

14 A No.

15 There was a DCE concentration approximately
16 46 micrograms per liter -- I'm reading these off of a
17 graph in Exhibit 25 -- measured in MW-10 in June of
18 1991. That's on the downgradient side of the
19 property.

20 Q Do you have Dames & Moore groundwater data
21 from 1991?

22 A I don't have it summarized in -- separately
23 in any table that I prepared.

24 Q Do you have the data?

25 A I don't know. I would have to look through

1 the EMD file.

2 Q Did you review the Dames & Moore report?

3 A Yes.

4 MR. MILLER: I'll mark Exhibit 30, the Dames &
5 Moore report of May 31, 1991.

6 (Plaintiff's Exhibit 30 was
7 marked for identification and is
8 attached hereto.)

9 MR. SLOME: Thank you.

10 BY MR. MILLER:

11 Q Yesterday you had a Dames & Moore report in
12 the form of a map.

13 A Yes, I believe that's the same as the last
14 page of this report.

15 Q Except this is an easier version to read
16 because it's blown up.

17 A Yes.

18 MR. SLOME: "This" being the document that he
19 had yesterday.

20 MR. MILLER: For the record, it's entitled
21 "Former Northrop Electronic System Division Facility,
22 500 East Orangethorpe Avenue, and it has a Bates
23 number of Northrop Grumman last four numbers 7708.

24 MR. SLOME: 7708.

25 MR. MILLER: Yes.

1 MR. SLOME: Are you going to mark it separately?

2 MR. MILLER: We've marked the report. We have a
3 smaller version, and I'm more than happy to let the
4 witness look at the larger version to be able to
5 accurately read the data and what's at the location.

6 Q Doesn't this map post some groundwater data?

7 MR. SLOME: Hand him the map.

8 THE WITNESS: If it does, I don't see it from a
9 quick examination.

10 BY MR. MILLER:

11 Q Well, let's go through Table 2, which has
12 some data, before we get into other aspects.

13 MR. SLOME: Table 2 is where?

14 MR. MILLER: Within Dames & Moore.

15 MR. SLOME: Okay.

16 MR. MILLER: Bates 7138.

17 MR. SLOME: 7138? The document starts at 75.

18 MR. MILLER: I'm talking about the Dames & Moore
19 report. The version I have has 37138 as a page
20 within the series.

21 MR. SLOME: 37- -- mine starts at 37517.

22 MR. MILLER: Let me make sure there aren't two
23 Dames & Moore reports.

24 First page of mine is the same Bates number
25 as yours. Apparently there's a sequential numbering

1 problem.

2 MR. SLOME: And just tell me again, the page
3 number you are looking for is?

4 MR. MILLER: 37138.

5 THE WITNESS: It jumps between 7568 and 7137.

6 BY MR. MILLER:

7 Q Correct.

8 MR. SLOME: Got it.

9 BY MR. MILLER:

10 Q On page 2 they found concentrations of DCE
11 in soil as high as 112,000 parts per billion west of
12 Y-1 in soil vapor probes, correct?

13 A Yes. I can't tell if they are referring to
14 a soil vapor concentration, though, or a soil matrix
15 concentration. I suppose it's implied that it would
16 be a soil vapor concentration. But that's what's
17 indicated.

18 Q In the column labeled "Boring," it says
19 "Dames & Moore eight soil vapor probes" and then
20 opposite that are the data.

21 A Yes.

22 Q The concentration of DCE in soil vapor of
23 112,000 parts per billion is higher than anything
24 Northrop found in its investigation of the property,
25 correct?

1 A I don't know. I would have to look at those
2 results. Also, I don't see units in this table.

3 Q Well, one would hope it's not parts per
4 million.

5 A Yes, or depths.

6 Q Depth would be a bit extreme. I don't know
7 that oil companies go that deep.

8 A No, I didn't mean as far as the depth at
9 which they were measuring these values.

10 Q I see that, yes.

11 Their comment is "Contamination should be
12 remediated"?

13 A Yes.

14 Q And this is in an area that was not
15 excavated by Northrop?

16 A The large excavation at Y-1 was to the -- on
17 the west side of Y-1.

18 Q To the area where the USTs were formerly
19 located?

20 A I'll check.

21 It looks like the excavation extended right
22 up to that area, the perimeter of the excavation.

23 Q But didn't include it?

24 A It may have included a portion of it, but it
25 did not include it all.

1 Q In other words, that area was not targeted
2 for excavation even after the comment by Dames &
3 Moore?

4 MR. SLOME: Objection; assumes facts as to when
5 targeting occurred.

6 BY MR. MILLER:

7 Q When was the last excavation at the EMD
8 property by Northrop?

9 A In May of 1991.

10 Q And this report came out in that month?

11 A Yes.

12 Q And do you know if Northrop did anything to
13 follow Dames & Moore's recommendation that that area
14 be remediated, where the DCE contamination was
15 detected at 110,000 parts per billion?

16 A I know the large excavation that I mentioned
17 previously was conducted in that area and there were
18 confirmatory samples that were collected from the
19 bottom and sides of that excavation as part of the
20 process.

21 Q It was excavated soil, and the samples at
22 that location did not include DCE at high levels
23 because that wasn't part of the excavated material,
24 correct?

25 A I don't think you can necessarily reach that

1 conclusion. I can look and see the date of the soil
2 vapor testing that was done by Dames & Moore. But if
3 their report came out May 31st, 1991, it would appear
4 that they were likely doing their testing either
5 during or maybe even prior to the excavation
6 activities, and it would not be surprising for them
7 to find elevated soil vapor levels at the location of
8 the large excavation before it was made or while it
9 was being made.

10 Q My point is that when the soil samples were
11 taken in that area during the excavation, they didn't
12 find the DCE at the levels that Dames & Moore did,
13 which implies the excavation didn't go that far.

14 A I wouldn't necessarily reach that
15 conclusion, no.

16 Q Well, what were the sample results for DCE
17 in the area closest to where Dames & Moore took their
18 samples? Use the map to make sure you know where
19 they took their samples.

20 A The apparent vapor sampling locations by
21 Dames & Moore do appear to be within the limits of
22 the excavation.

23 Q What location on the map and what map are
24 you relying on to answer that?

25 A I'm relying on a version of Figure 10 where

1 we've superimposed the excavation limits on it. The
2 blue dots that begin with a "VP" designation on this
3 site plan, as on the other oversized site plans, I
4 believe designate the Dames & Moore vapor probe
5 locations.

6 Q When you say "blue dots," are you talking
7 about a green circle surrounding a blue line, a white
8 inner and a blue center?

9 A No. For example --

10 Q Okay.

11 A -- "VP" -- I can't read the prefix, but is
12 that a VP -- would be a series of VP designations
13 along the west side of the building.

14 Q So basically it's a circle that is half
15 filled in in green and half background color?

16 A Yes.

17 And this faint outline that you see here
18 represents the limits of the second of the larger
19 excavation in that area.

20 Q Are the Dames & Moore groundwater results
21 posted on the site map we went over that's attached
22 to their report?

23 A I don't believe I've seen any groundwater
24 results that were obtained by Dames & Moore.

25 Q You don't recall seeing a document that was

1 produced in discovery where they found DCE in
2 groundwater in the 40s, 50s and 60s at the site?

3 A By "40s, 50s and 60s" you are referring to
4 micrograms per liter?

5 Q Parts per billion.

6 A That Dames & Moore produced?

7 Q It was from their investigation.

8 A No.

9 Q Do you recall that Dames & Moore complained
10 that they weren't given access to the soil once the
11 building and concrete were scraped off so they could
12 examine it for staining?

13 A I recall that they complained that they
14 weren't given access during the site demolition or
15 closure activities, yes.

16 Q Doesn't that imply that the excavation was
17 well under way before they took their samples?

18 A I don't know. They were both occurring, it
19 would appear, at least within a few weeks of each
20 other.

21 Q And you have no Dames & Moore groundwater
22 samples at all in your dataset?

23 A I don't recall seeing those. I recall
24 Dames & Moore summarizing groundwater results by
25 others, but I don't recall Dames & Moore actively

1 collecting groundwater samples.

2 Q Did you review Exhibit 30?

3 MR. SLOME: The Dames & Moore report.

4 BY MR. MILLER:

5 Q The Dames & Moore report.

6 A Yes.

7 Q Aren't they rather critical of the quality
8 of the investigation done at the EMD site?

9 A I'm looking at my summary notes.

10 I see that they complained that they were
11 not allowed onsite during the site demolition
12 activities.

13 I see that they noted that the
14 Water Board concurred that the former hazardous waste
15 area was not a source of VOCs. I don't see any
16 groundwater sampling in their scope. It says they
17 collected 16 surface soil samples and excavated
18 15 borings and performed soil vapor sampling in five
19 areas and performed a radiation survey, but I don't
20 see anything that refers to groundwater sampling.

21 I see that they concluded that contamination
22 may be present at the site and that the site may have
23 been a source of at least a portion of the prior
24 groundwater contamination and that they agree that an
25 offsite source of groundwater contamination

1 apparently exists.

2 I see where they said that they felt the
3 closure data for the underground storage tanks was
4 incomplete and that based on their soil vapor survey
5 results they felt that VOCs were present in two
6 former underground storage tank areas.

7 I see where they expressed a concern about
8 what was referred to as the former garden area.

9 I see they recommended additional
10 assessment.

11 And I see references to at least two borings
12 that they drilled deep enough to encounter
13 groundwater. So I suppose they could have
14 potentially sampled it, but I don't see them
15 indicating that they sampled it or any results in
16 their report.

17 Q Did you read the deposition of the Dames &
18 Moore employee taken in this case?

19 A No.

20 Q And specifically he discussed this
21 particular report and was involved in its
22 preparation.

23 You don't recall reading such a deposition?

24 A No.

25 MR. MILLER: Let's break early for lunch.

1 MR. SLOME: Sounds good.

2 THE VIDEOGRAPHER: We are going off the record.

3 The time is 11:46.

4 (Off the record.)

5 THE VIDEOGRAPHER: This now begins disk

6 number 3, Volume 2, in the deposition of Glenn

7 Tofani. We are now back on the record. The time is

8 12:56.

9 MR. SLOME: Okay.

10 BY MR. MILLER:

11 Q Mr. Tofani, what is the best report

12 concerning groundwater quality data at EMD in the

13 early '90s?

14 A I believe all of the groundwater analytical

15 results from the EMD site for that period, in fact

16 for the entire period during which wells are being

17 monitored onsite, is contained in the attachment to

18 my summary report and also contained in the VOC

19 summary figures that I provided you just before

20 lunch.

21 I was also going to mention, in case you are

22 interested, before we started that I had someone

23 check over the lunch hour to see what the relative

24 sequencing was of the Dames & Moore soil vapor

25 testing that we were discussing relative to the large

1 excavation at the site.

2 Q And what was the result?

3 A Dames & Moore was onsite doing the soil
4 vapor testing it looks like in May -- on May 8th and
5 9th of 1991. The excavation activities were
6 initiated on May 14th and completed on May 24th. So
7 those vapor sampling activities would have preceded
8 the excavation.

9 (Whereupon Ms. Meadows entered
10 the proceedings.)

11 (Plaintiff's Exhibit 31 was
12 marked for identification and is
13 attached hereto.)

14 BY MR. MILLER:

15 Q Okay. Let me show you Exhibit 31. It's the
16 results through March 1993 of groundwater quality
17 sampling for EMD by McLaren Hart.

18 Before we get into the detail, if you look
19 at the map entitled "Figure 1" by McLaren Hart, which
20 is at page 2 of the report --

21 A Yes.

22 Q -- what are the numbers of the upgradient
23 wells?

24 A Most easterly wells shown are MW-8 and MW-9.

25 Q They are, however, on Northrop property,

1 correct?

2 A No.

3 Q They are on the Union Pacific Railroad
4 property?

5 A Yes.

6 Q And what other wells do you consider
7 upgradient of EMD?

8 MR. SLOME: As shown on this map?

9 BY MR. MILLER:

10 Q If there are others that are part of the
11 data in the immediate vicinity, whether it's shown on
12 this map or not, I would like to know it.

13 A AM-39, AM-40 and AM-42 are the most
14 proximate.

15 Q I take it that you would agree that MW-2,
16 MW-1A and -B, MW-10, MW-11, MW-3, MW-4 and -6 and
17 MW-12 and -13 are all downgradient, correct?

18 A Relative to MW-8 and -9 in the three offsite
19 wells that I just mentioned, yes.

20 Q They are also downgradient of activities
21 that are suspected of having the potential to cause
22 contamination, correct?

23 A Yes, with the caveat that some of these
24 wells typically where they are paired together you
25 have a shallow zone and a deeper zone well. And the

1 shallow zone would be the screen located closest to
2 the potential source areas and the deeper screen
3 further away.

4 Q So let's take an upgradient well, MW-8,
5 page 6.

6 A Yes.

7 Q DCE and TCA are at or below 5 parts per
8 billion or so in the shallow sampling of MW-8 which
9 is upgradient, correct?

10 A I'm sorry. What were the two numbers?

11 Q Shallow MW-8, page 6 of the report, the
12 concentrations of DCE range from 3 to 5.3 parts per
13 billion, of TCA from 5.4 to 2.3.

14 A Yes.

15 Q And let's go to MW-8 deep, page 9. Sorry,
16 that still says "shallow."

17 The deep wells are listed in Table 5 and
18 MW-8 is not listed.

19 A That should be MW-9.

20 Q And MW-9, the highest concentration of DCE
21 is 9 and the highest concentration of TCA is 7,
22 correct?

23 A 14 and 7, I believe. 14 for DCE and --

24 Q MW-9 -- I'm sorry. I see the 14 now. Thank
25 you.

1 A I might mention, the easiest way to look at
2 compilation of this data, if that's what you are
3 interested in, these two wells subsequently became
4 AM-42 and AM-42A. So there are graphs and data that
5 extend through 2010 for these wells.

6 Q All right. Let's compare that to MW-1A that
7 is immediately to the west of the building and in the
8 area where high detections occurred in soil.

9 You would agree that that western part of
10 the building was an area contaminated with TCA?

11 A The soil, yes.

12 Q The TCA in MW-1A ranges from 72 parts per
13 billion to a low of 19 with the other two values in
14 the 40s.

15 MR. SLOME: No. One of the other two values in
16 the 40s.

17 BY MR. MILLER:

18 Q Two values in the 40s. 40 and 44, correct?

19 A I'm looking at the -- by graph it seems to
20 be consistent, the data you just cited with what I
21 have graphed --

22 MR. SLOME: Yes, sorry.

23 THE WITNESS: -- for the deep screen.

24 BY MR. MILLER:

25 Q And 1,1-DCE ranges from 50 to 16.

1 A That to -- I'm sorry, what was the upper
2 concentration?

3 Q 50.

4 A In MW-1A. I've got a concentration, it
5 would appear to be as high as 65 plotted for MW-1A
6 for DCE.

7 Q In the deep well?

8 A Yes.

9 Q Are you on page 10?

10 A I have that open as well.

11 Q On page 10 for the period reported 1990, the
12 DCE concentrations ranged from 50 to 16.

13 A Yes.

14 Q You have later data that shows a
15 concentration as high as 65 for DCE?

16 A No. It's within the same period.

17 Q But it's not shown on the McLaren report?

18 A Not in their summary table, no.

19 Q If we look at the map, MW-11 is also -- and
20 MW-10 are also to the west of the Y-1 building within
21 the EMD complex, correct?

22 A Yes.

23 Q And they are directly to the west of MW-1A
24 and -B?

25 A More or less, yes.

1 Q In shallow groundwater, MW-11 ranges between
2 8.8 for TCA down to 1.2 -- I'm sorry, 13 to 1.2,
3 correct?

4 A Did you say 34? You are talking about MW-11
5 DCE?

6 Q Yes -- no, I was going over of TCA.
7 13 to 1.2.

8 A Yes.

9 Q And for DCE, 34 to 1.8.

10 A Yes.

11 Q So the shallow groundwater downgradient of
12 building Y-1 has, on occasion, significant levels of
13 both DCE and TCA, correct?

14 A Yes. Significant in that they are above
15 MCLs.

16 Q MW-13 is to the west of MW-8 and -9 and the
17 other wells you characterized is upgradient?

18 A Yes.

19 Q And it's to the -- what building in the EMD
20 complex is to the east of those two sample points?

21 A MW-12 and MW-13, is that what you are asking
22 about?

23 Q Yes.

24 A There's no building immediately east. They
25 are next to a helicopter pad. If you continue east

1 about halfway across the site, you would get to the
2 northern end of building Y-2.

3 Q Were those monitoring wells placed at that
4 location because of concerns about releases from Y-2?

5 A Possibly. I believe they were constructed
6 in conjunction with the abandonment of other onsite
7 wells that were in the way during the decommissioning
8 of the facility. And the Water Board asked for
9 upgradient as well as downgradient wells, and these
10 were one of the downgradient well pairs that were
11 installed in response to that request.

12 Q If you look at MW-13 in the shallow
13 groundwater, November 1991, 48 parts per billion for
14 DCE, correct?

15 A Yes.

16 Q And TCA up to 12 parts per billion in the
17 same sampling?

18 A Yes.

19 Q Was that associated with a high groundwater
20 period or following a high groundwater period?

21 A No. It's at a relatively low -- I would say
22 atypically low groundwater period as far as the
23 shallow aquifer goes.

24 Q MW-10 is downgradient and Y-1 is to the east
25 of that?

1 A Yes.

2 Q MW-10 had concentrations of DCE as high as
3 59 during this period, which covers '91 to '93. I'm
4 looking at page 7 of the McLaren report.

5 A That's consistent with what's plotted on my
6 graph, yes.

7 Q And the TCA concentrations were as high as
8 25?

9 A That's consistent as well, yes.

10 Q Don't these data show elevated levels of DCE
11 in shallow groundwater downgradient of the site which
12 do not appear in the upgradient data?

13 A No. I think taken as a whole the available
14 data does not indicate an increase in the VOC levels
15 downgradient of the site.

16 Q If we focus on the shallow groundwater data,
17 upgradient the concentrations are significantly lower
18 than downgradient, correct?

19 A Are you talking about exclusively in
20 monitoring wells 8 and 9 as the upgradient wells?

21 Q Those were the ones you identified for me.

22 A And right now you want to limit it to the
23 shallow wells, so that would be MW-8 as the only
24 upgradient well that we're looking at?

25 Q For now we'll do that, then I will ask you

1 if there's more a appropriate upgradient well to look
2 at shallow.

3 A Okay. So if we're limiting it to MW-8 as
4 the sole upgradient well, that well looks like we
5 only have three monitoring events for; and for those
6 three monitoring events, the VOC levels were
7 relatively low compared to other offsite upgradient
8 wells.

9 Q If you look at Figure 2, it shows the
10 direction of groundwater flow in the area for the
11 shallow groundwater in March 1993.

12 A Yes.

13 Q During that time period, MW-8 would not have
14 been upgradient, and neither would any of the other
15 upgradient wells that you identified because the
16 groundwater flow direction had a southerly component,
17 it was going to the southwest?

18 A Yes. You have to look more in the area of
19 AM-39 and AM-40, which are offsite wells that during
20 this period would be more directly upgradient of the
21 onsite wells in that area.

22 (Whereupon Mr. Geocar is entered
23 the proceedings.)

24 BY MR. MILLER:

25 Q But that would place the flow toward MW-10,

1 -11, 1A and 1B, correct, from the Y-1 building? And
2 also MW-3?

3 A Yes, in general.

4 Q MW-3, the DCE was as high as 65 and the TCA
5 was as high as 49. That's on page 10, correct?

6 A You said 65 for DCE and 49 for TCA?

7 Q Yes.

8 A Yes, I believe that's correct.

9 Q MW-3, which would be downgradient of the Y-1
10 building under a southeasterly flow had
11 concentrations as high as 65 for DCE and 49 for TCA.

12 A I thought that was the one you just asked me
13 about before. Were you referring to a different
14 well?

15 Q I thought I had covered MW-2 and apparently
16 I hadn't, and I need to rephrase my question.

17 MW-2, which is near the Y-1 building, was as
18 high as 30 for DCE and 24 for TCA, but you wouldn't
19 interpret that as being a downgradient well of some
20 suspected contamination?

21 A Periodically it would be, but not as of the
22 date of the piezometric levels that are shown in this
23 report.

24 (Whereupon Mr. Kaplan entered
25 the proceedings.)

1 BY MR. MILLER:

2 Q All right. So what monitoring well would be
3 upgradient under a southwesterly flow shown at
4 Figure 2?

5 A AM-39 and AM-40.

6 Q Do you have a map that shows the relative
7 location?

8 A Yes, they are shown on Exhibit 28.

9 Q So if we go back to the groundwater quality
10 data for AM-39A, using Dr. Waddell's groundwater
11 quality report, which is an exhibit --

12 MR. SLOME: What exhibit is it?

13 MR. MILLER: Was it 28?

14 MR. SLOME: 27.

15 THE WITNESS: 27.

16 BY MR. MILLER:

17 Q What page would it appear on?

18 A We're looking for AM-39.

19 Q Yes. "A."

20 A "A" begins on looks like 1- --

21 MR. SLOME: 60 something.

22 THE WITNESS: -63.

23 BY MR. MILLER:

24 Q I see the "A" designation for the shallow
25 groundwater interval of 115 to 135 feet being sampled

1 in March '93, correct?

2 A Yes.

3 Q TCA 2.5, DCE 6.2, correct?

4 A I'm sorry. What were those numbers?

5 Q 2.5 for TCA, 6.2 for DCE.

6 A Yes. I believe that's correct.

7 Q And if you were going to look at the points
8 under a southwesterly gradient that were more
9 directly upgradient of the ones I pointed out to the
10 west of the Y-1 building, that would be the
11 monitoring well to look to for shallow groundwater
12 conditions, correct?

13 A That one, and AM-40, yes.

14 Q AM-40 is more southerly.

15 A Yes, relative to AM-39.

16 Q And you wouldn't expect a flow path from
17 there under a southwesterly flow to MW-1A or to MW-10
18 or -11, correct?

19 A No. More so for MW-12 and -13 that you had
20 asked me about earlier.

21 Q Okay. So let's go to 40, page 165, correct?

22 A Yes.

23 Q In 40A, starting with the earliest data in
24 1993, all detections of TCA in 1993 are below 20, and
25 that well is screened 145 to 165 feet. So it's

1 deeper than the downgradient wells, correct?

2 A Some of the downgradient wells are deeper,
3 some are shallower.

4 Q This upgradient well at 145 to 165 feet is
5 not the shallowest groundwater that you can sample
6 with respect to the EMD site, correct?

7 A Well, this well's located upgradient of the
8 EMD site, so you can't sample any groundwater from
9 the EMD site at this location. There are wells at
10 the EMD site with shallower screens and wells with
11 deeper screens.

12 Q If we're going to compare apples to apples,
13 it would be helpful to have a similar depth at AM-40,
14 but the shallowest depth is deeper than the
15 downgradient wells at MW-1A, MW-10 and MW-11,
16 correct?

17 MR. SLOME: Objection; compound.

18 THE WITNESS: I believe that's correct.

19 BY MR. MILLER:

20 Q Doesn't this show a contribution of DCE to
21 the shallow groundwater, this data that we went over,
22 and TCA which would create DCE?

23 A I don't think so, no.

24 Q If the numbers are higher in the
25 downgradient direction than the upgradient direction

1 for samples taken at similar depths, doesn't that
2 indicate the likelihood that there's a contribution
3 of contaminants to the shallow groundwater associated
4 with the site?

5 A They have to be correlated with respect to
6 time also and that the concentrations vary over time
7 as a result of different mechanisms, fluctuations in
8 groundwater elevation, changes in the direction of
9 groundwater flow and degradation of TCA to DCE.

10 So not only do the wells have to be aligned
11 upgradient and downgradient with that alignment
12 changing over a period of time, the time lag or
13 travel time for the VOCs between the two wells also
14 needs to be considered in this instance since overall
15 we've got declining VOC concentrations at the site.

16 If the VOC levels were constant, you
17 wouldn't have to account for the time lag. But with
18 a falling VOC level, if we have a VOC concentration
19 upgradient at a point, a monitoring well, and it
20 takes that water, let's say, a year to travel
21 downgradient and at the same time the VOC levels are
22 generally falling, then we have to synchronize, if
23 you will, the dates of the analytical results that
24 we're comparing for the upgradient and downgradient
25 wells.

1 Q So are you saying that levels in the 40s,
2 50s and 60 parts per billion range of DCE are falling
3 levels compared to earlier results?

4 A If I look at the available data, the overall
5 trend for the wells that we have the longest records
6 for, which is going to be 39, 40 and 42, is that
7 there's a significant trend and tendency for VOC
8 levels to decline over time.

9 Q That's after this time period. This dataset
10 covers of '91, '92 and '93, correct?

11 A Yes.

12 Q If you look at the direction of flow -- take
13 Figure 4.

14 A Yes.

15 Q The direction of flow in '93, at least, is
16 inconsistent with having a Crucible plume reach the
17 Y-1 building areas and areas downgradient of it
18 because it has a southwesterly component, correct?

19 A It has a south --

20 It's shown to have a southwesterly component
21 at the EMD site at that point in time. This is from
22 March of '93. If we go back four months, it's a
23 little less, more west- -- it's more westerly and
24 less southwesterly. If we go back to 1990, it's
25 northwesterly.

1 So the average direction of flow, although
2 there's temporal variations, the average of
3 predominant direction of flow is more or less due
4 west.

5 Q Between June '92 and '93, the flow was
6 consistently to the south and southwest, correct?

7 A For the three monitoring events that are
8 shown here, the flow direction is shown to be
9 southwest -- west to southwest.

10 Q And if you extended that flow line
11 upgradient, is there a known source of DCE?

12 A Well, if you extend that flow direction
13 upgradient you still run into the Crucible site.

14 Q With a southwesterly flow?

15 A Here's the site plan, here's the arrow
16 aligned. So if I take this point and go parallel to
17 that arrow, it's more or less along the distance
18 arrow that I've drawn on Exhibit 28.

19 Q Which would reach only at most the southern
20 end of the EMD property, that corner basically where
21 AM-42 is?

22 A Well, I think at that direction, probably
23 the entire second half. And what we need to keep in
24 mind in this type of projection is that for the
25 numbers that we've been using or the flow velocities

1 that were suggested by Dr. Waddell, we've got
2 something on the order of perhaps a five-year --
3 three- to five-year travel time from Crucible to EMD.
4 So we don't have a consistent southwesterly flow
5 direction for that length of time. Over that length
6 of time it's going to tend to be more westerly.

7 (Whereupon Mr. Geocariss exited
8 the proceedings.)

9 BY MR. MILLER:

10 Q If there's an upgradient source, you would
11 expect to see it in the deeper groundwater and not in
12 the shallowest groundwater?

13 MR. SLOME: Where?

14 BY MR. MILLER:

15 Q Kester, for one.

16 MR. SLOME: Objection; vague and ambiguous.

17 I don't understand the question.

18 THE WITNESS: If there's an upgradient -- a
19 source upgradient of EMD such as Crucible?

20 BY MR. MILLER:

21 Q Let's just take Crucible for the moment.
22 Given the distance, which is about a mile, you would
23 expect that any contribution of TCA or DCE to the
24 groundwater would be deeper than the shallow
25 groundwater underneath the EMD site. It would tend

1 to be more than 150 feet deep.

2 A Not necessarily. I wouldn't necessarily
3 expect it to all be driven to that depth. You might
4 expect to have higher contaminant concentrations
5 potentially at depth. The only thing that you could
6 say with any reasonable certainty is if you have a
7 site, whether it's EMD or another site in a similar
8 setting, and you are finding contamination in the
9 very lower portion of the shallow aquifer, that that
10 contamination has most likely come from a relatively
11 distant upgradient source because there simply isn't
12 enough time or a pathway, if you will, for that
13 contamination to get to depth over a short distance.

14 And that, I should say, excludes the DNAPL
15 scenario that we --

16 Q Understood.

17 In your summary of Dr. Waddell's deposition,
18 he pointed out there were two explanations for the
19 presence of DCE and TCA in a deeper zone beneath the
20 EMD site. One was that the way Northrop and its
21 consultants constructed monitoring wells created a
22 pathway for that to occur, and the other is that
23 contamination in the perched zone went in a different
24 direction than the flow of groundwater, and after it
25 reached a point where it could escape the confining

1 layers that kept it perched made its way down and
2 then came back with a direction of groundwater flow.

3 Do you recall that?

4 A Yes.

5 Q And you had a figure that purports to deal
6 with that that you showed me yesterday?

7 A Yes. Did that get marked?

8 Q No, not yet. Not only that, but it's been
9 moved around.

10 A Oh, yeah.

11 Q You characterize this as a perched
12 groundwater mound beneath the site.

13 Did Dr. Waddell actually say there was a
14 mound?

15 A Yes.

16 Q Perched water mounds on top of a confining
17 layer. It develops some thickness on top of it.

18 A On top of a low permeability layer, that's
19 not necessarily a confining layer, use of the term
20 "confining."

21 Q That's fine.

22 A Okay.

23 Q The whole point of perched water is that
24 it's not getting through the confining layer beneath
25 it rapidly enough so the water accumulates, including

1 any contaminants, correct?

2 A Yes.

3 Q That water will flow in the direction or
4 slope of the confining layer which may not be in the
5 same direction as the direction of groundwater flow,
6 correct?

7 A I say it will typically flow in the
8 direction of which the layer upon which it is perched
9 is inclined, and that most often is in the direction
10 of groundwater flow, though not universally.

11 Q If you introduce a solvent like PCE or TCE
12 to the soil, do they necessarily go straight down
13 when they are in the vadose zone or do they sometimes
14 encounter confining layers that cause them to move in
15 a different direction than straight down?

16 A They don't necessarily go straight down.

17 Q And when they encounter a confining layer,
18 they try to go around it basically?

19 A It depends how extensive that layer is.
20 They will go through it given a sufficient amount of
21 time. If it's a small inclusion, the majority of
22 whatever contamination is in question may go around
23 it.

24 Q Is the same principle applicable to TCA?

25 A As for TCE?

1 Q Yes.

2 A Yes.

3 Q What data do you have that demonstrates that
4 there was no shortcut as a result of the installation
5 of one or more monitoring wells to deeper
6 groundwater; that is, an artificial pathway created
7 by the construction of that well?

8 MR. SLOME: Please reread the question, please.

9 (The record was read as follows:

10 "QUESTION: What data do you have
11 that demonstrates that there was no
12 shortcut as a result of the
13 installation of one or more monitoring
14 wells to deeper groundwater; that is,
15 an artificial pathway created by the
16 construction of that well?")

17 MR. SLOME: I understand the question.

18 BY MR. MILLER:

19 Q You understand the concept of a shortcut to
20 deeper groundwater?

21 A I believe so.

22 Q And it's known that if you improperly
23 construct a monitoring well it could provide a
24 pathway that wouldn't exist through nature down to
25 groundwater and avoiding the confining layers because

1 of the void between the monitoring well and the
2 confining layer, correct?

3 A Yes.

4 Q Is that known to happen?

5 A Yes.

6 Q Do you have any opinions concerning the
7 construction of monitoring wells that would preclude
8 that movement through a shortcut or more direct path
9 through the confining layers created by a monitoring
10 well?

11 A You are asking specifically with respect to
12 the EMD site?

13 Q Yes.

14 A Well, I've reviewed the well logs, the
15 drilling logs for the monitoring wells that
16 Dr. Waddell was referring to with respect to his
17 theory that the installation were problematic and
18 created potentially preferential flow paths along the
19 casings, and I don't see that occurring based on the
20 records that I've reviewed.

21 Q Based on the drilling records?

22 A Yes.

23 Q Did you review his testimony about what the
24 problems were with the monitoring well construction?

25 A Yes.

1 Q And you disagree with it?

2 A I don't disagree that there were issues
3 encountered during the construction of the monitoring
4 wells that, among other things, involved welds at
5 conductor casings pulling apart that created
6 complications with the installation. But when I look
7 at how those problems were resolved, I don't see them
8 creating the potential for downward flow or
9 preferential downward flow pathway along the casing.

10 Q What do you mean how they were resolved?

11 A I'm looking at page 15 of my chronological
12 summary in Exhibit 24, if you start with MW-4 at the
13 bottom of the page, that well was drilled with air
14 and foam. There was an eight-inch temporary casing
15 that was installed at that location. They installed
16 a four-inch casing that was intended to be left in
17 place inside that. And as they were backfilling it,
18 the way that you would typically do that is
19 progressively pull the larger casing and -- in
20 advance of the backfill.

21 It looks like they extended the backfill up
22 into a portion of the larger diameter casing while
23 they were constructing this well so that that
24 backfill locked the larger casing to the smaller
25 casing. It was intended to be left in place. So

1 when they went to pull up the eight-inch casing
2 further, the four-inch casing came with it.

3 At that location, they abandoned the hole,
4 left the eight-inch steel casing in place, grouted
5 the interior and then -- oh, no, just left the
6 eight-inch steel casing in place at that location,
7 since the four-inch well was already installed and
8 then backfilled the annulus the rest of the way.

9 I don't see that situation creating a
10 preferential flow path since the entire hole down to
11 a depth that was 13 feet above the upper well screen
12 was cased with an eight-inch steel casing that was
13 intact.

14 Q When they were trying to get the casing out
15 of the ground, they were exerting some force? They
16 wanted it back?

17 A Yes.

18 Q Does that lead to cracking?

19 A There's two instances at MW-1 and MW-2 when
20 they were retrieving the casing that occurred and it
21 pulled apart. So if that would have occurred, I
22 think they would have pulled the casing apart like
23 they did at MW-1 and MW-2.

24 Q If they knew. It's beneath the surface.

25 A If it cracked when they were retrieving it,

1 it would have broken. And if it had been broken, it
2 wouldn't have brought the four-inch casing up with
3 it.

4 Q Are you claiming you can't have cracks
5 without a total failure and separation of the casing?

6 A I think it's very probable that if they were
7 pulling on a casing to retrieve it, with sufficient
8 force and there was a poor weld, an inadequate weld,
9 a weak weld that would have cracked, that the casing
10 would have separated like it did in the other two
11 instances, and that would have been apparent.

12 Q Haven't you experienced instances where
13 there was cracking without failure so that you broke
14 it off, in effect?

15 A I'm not sure what you mean by "broke it
16 off."

17 Q You get part of it back and part of it stays
18 in the hole.

19 A That would suggest that there was failure if
20 part of it --

21 Q That's what I was defining as "failure."

22 You get the casing back but you don't get it
23 all back because you not only cracked it, you made it
24 two different pieces.

25 A I don't know if that's ever happened on a

1 project that I've worked on, but it certainly can
2 happen.

3 Q Dr. Waddell pointed out that at two sites
4 there was significant flow to the east in the perched
5 zone followed by the contaminants reaching
6 groundwater from data at other sites.

7 Did you even review the data at the other
8 sites?

9 MR. SLOME: Objection; asked and answered.

10 MR. MILLER: Not that way.

11 THE WITNESS: I probably have seen that data,
12 but I don't specifically recall reviewing it.

13 BY MR. MILLER:

14 Q What are the two sites where there was
15 easterly flow followed by contamination of a deeper
16 aquifer?

17 A I believe he refers to a gas station site
18 that's located to the east of EMD, and I don't recall
19 the name of the other one.

20 Q Aren't they both within a mile of the EMD
21 site?

22 A My recollection is that he was referring to
23 two sites that were not far away.

24 Q If the soils were laid down at two sites
25 within a mile in that direction, how do you exclude

1 the possibility that the confining layer in a
2 semi-perched zone at EMD didn't have a similar
3 characteristic?

4 A Well, first of all, it would be very unusual
5 for soil layers over significant distance to be
6 deposited or laid down in a direction that was
7 inconsistent with the topography. It's not
8 impossible, but it would be unusual. But so --

9 Q So it would be unusual --

10 MR. SLOME: Let him finish his answer.

11 THE WITNESS: But more importantly, the easiest
12 way I think to preclude that type of flow is to
13 simply look at the data which indicates that there
14 was not a significant zone of perched groundwater at
15 EMD.

16 BY MR. MILLER:

17 Q What do you mean by "a significant zone"?

18 A I mean the vast majority by relatively wide
19 margin of the borings that were deep enough --
20 drilled deep enough to encounter perched water at an
21 elevation that's consistent with his theory were
22 found to be dry without any indication of perched
23 water.

24 Q What elevation is that?

25 A He referenced an elevation of, I believe,

1 110 as being necessary for easterly groundwater flow
2 to occur, in his opinion, over into the area of AM-40
3 and 42.

4 Q Wasn't perched groundwater found at that
5 interval on occasion and wasn't it significantly
6 contaminated?

7 A I've only seen one sampling event for
8 perched groundwater, and those results --

9 Q I want to make sure we're not quibbling
10 about terminology. "Semi-perched" and "perched" are
11 the same in this context, or not?

12 A I don't believe I've used the term
13 "semi-perched."

14 Q Was there semi-perched groundwater beneath
15 EMD?

16 A I would just use the term "perched."

17 Q Okay.

18 A So the only perched groundwater sampling
19 event that I have seen is the 2010 data, in that at
20 the four sampling locations in 2010 a relatively thin
21 zone of perched groundwater was identified at one of
22 those near the southwest corner of the site, and that
23 sample was non-detect for all VOCs.

24 Q Are perched samples encountered at -- next
25 door at Y-12?

1 A Yes. Perched groundwater is present at
2 Y-12.

3 Q With more frequency than at EMD?

4 A Yes.

5 Q There's a relatively limited number of
6 groundwater samples at EMD because they destroyed the
7 monitoring wells there in '92 or '3. I think it's
8 '93.

9 MR. SLOME: Objection. Objection. Objection.
10 Argumentative as phrased.

11 But you can answer.

12 BY MR. MILLER:

13 Q Weren't all of the monitoring wells at the
14 EMD site destroyed in 1993?

15 A As far as the onsite wells, yes, I believe
16 so.

17 Q So the only data for monitoring wells onsite
18 is between what years?

19 A The first wells were installed and the first
20 monitoring was performed in 1987 and the latest data
21 would be for '93, not counting MW-8 and MW-9, which
22 were converted into AM-42 and 42A.

23 Q So you don't believe any of the
24 contamination released at the EMD site caused
25 contamination of groundwater?

1 A I can't rule out the possibility that there
2 was some localized contamination of groundwater
3 caused at the EMD site. If I look at the historic
4 upgradient and downgradient VOC levels, there's no
5 indication of any VOC source at EMD. So to the
6 extent that there was localized contamination at EMD
7 caused by one or more onsite releases, I don't
8 believe it's had any significant or perceptible
9 effect on the regional groundwater in the shallow
10 aquifer or the principal aquifer.

11 Q Despite the numbers I showed you in the
12 shallow aquifer?

13 MR. SLOME: That's arguing with him.

14 Objection; argumentative.

15 BY MR. MILLER:

16 Q Correct?

17 A Yes.

18 Q You think all of that contamination came
19 from upgradient sources even though it was in shallow
20 groundwater?

21 A Yes. I think there's clearly VOCs in the
22 upper portion of the shallow aquifer that are coming
23 from upgradient sources.

24 Q In concentrations as high as 50 and 60 parts
25 per billion in the shallow groundwater?

1 A I should have made these different colors.

2 Yes.

3 Q What do you base that on?

4 A I'm looking at the historic graphs for the
5 upgradient wells.

6 Q What upgradient wells?

7 A I'm looking at AM-40 right now.

8 Q Isn't that 145-plus feet down?

9 A Yes, near the middle.

10 Q It's not shallow?

11 A It's not as shallow as some of the shallow
12 wells at EMD or not as deep as some of the deep wells
13 at EMD.

14 Q It's in the middle zone basically?

15 A It's near the -- I would say the typical
16 center of the shallow aquifer. Although during
17 periods of low groundwater levels, it's going to end
18 up being relatively close to the top.

19 Q What other upgradient well are you looking
20 at?

21 A I'm just looking at AM-40A and AM-40 right
22 now.

23 Q Do you think it's fair to compare
24 groundwater 145 to depths beneath that to groundwater
25 at 120 to 110?

1 A I think the data from this well where it's
2 screened indicates that there would be VOCs present
3 as a result of this contamination beneath the EMD
4 site in the upper portion of the shallow aquifer.

5 Q Can you think of any other significant
6 source of upgradient DCE concentrations besides
7 Crucible that you can identify?

8 A No.

9 You said DCE with a "D"?

10 Q That's correct.

11 A This is the plate I was looking for in
12 response to one of your earlier questions.

13 Q I'm happy to give it to you if you need it
14 to look at it and clarify a prior answer.

15 A I don't necessarily. I think we moved on
16 now.

17 But just for the sake of completeness, what
18 I had asked someone to do on this site plan, and it's
19 still a bit of a work in progress, but it shows all
20 of the boring or testing locations at the EMD site of
21 which there are hundreds and hundreds.

22 I asked them to color code the deeper
23 borings that extended to a sufficient depth to detect
24 the groundwater that could potentially be present
25 under the mound theory and to color code borings

1 where perched groundwater was identified red like
2 these, in the color code borings where perched
3 groundwater was not identified green.

4 Q There are quite a few borings that didn't go
5 down deep enough to detect perched groundwater at
6 110 feet in this area, correct?

7 A Yes.

8 Q So did you limit yourself when you depicted
9 things in green to borings that were at least deep
10 enough to detect perched groundwater at that
11 interval?

12 A Yes. Shallower borings were eliminated.
13 Rotary wash borings where perched groundwater might
14 not have been apparent were eliminated.

15 Q And you got two red dots?

16 A A third over on the southeast corner of the
17 site. So we've got three locations out of, you know,
18 approximately 30 where some evidence of perched
19 groundwater was detected.

20 Q Where are the 30 that are at least as deep
21 as 110 feet?

22 A Well, the other green dots you see; here,
23 the southwest, southeast, here, the western property
24 line, here in the middle of the site, and then a
25 large number, the majority of them, beneath the

1 anodic room. And this is an inset of the anodic
2 room.

3 Q All of the anodic room sampling was
4 conducted in basically a one-year period, maybe two?

5 A Yes.

6 Q So the dataset are heavily influenced by the
7 fact that the majority of the borings are in '90, '91
8 before the excavation, correct?

9 A Yes.

10 Q So in terms of evaluation of perched
11 groundwater over time, that's a pretty shallow window
12 to draw a lot of temporal conclusions from, isn't it?

13 A It's a window during which --

14 If groundwater was going to be present, it
15 is the most critical window to look at and the window
16 with the highest probability of finding perched
17 groundwater.

18 Q That wasn't the wettest year. There were
19 wet years before '91.

20 A I was looking at it from the perspective of
21 the source of perched groundwater as postulated by
22 Dr. Waddell, that source being leakage from the
23 pipes, the sewer lines, the anodic room sump,
24 particularly in the area of the anodic room.

25 Q Well, if --

1 MR. SLOME: Let him finish. Let him finish.

2 THE WITNESS: And I was going to say that's
3 where the prevalence of the data is. There is more
4 than enough data in that area to document that not
5 only is there not perched groundwater at the location
6 where there appears to have been some water --
7 wastewater leaking into the ground from the source
8 identified by Dr. Waddell, that when you get down to
9 the depth of where the perched zone could potentially
10 be present, the soils at that location, the boring
11 logs are generally described as no more than moist.
12 There's simply no indication of wetness, let alone
13 standing or perched groundwater.

14 BY MR. MILLER:

15 Q Since they removed the pipe and found the
16 lower half of the pipe, more or less, to be gone --
17 and they did that in 1990?

18 A I could look up the date if you would like.

19 But that's the point in time --

20 Q I think I have some photographs.

21 A That's the point in time when the borings
22 and the excavation activities in that area were
23 initiated, and they confirmed that there was not
24 perched water present at that time immediately after
25 the leakage was identified.

1 Q Those pipes would have been leaking for
2 years before they were removed, correct, if the
3 majority of the pipe was gone?

4 A I don't know.

5 Q Do you know the date of the photographs
6 where they show it removed?

7 A No.

8 Q Do you have any narrative that explains the
9 condition of the pipe so that the pipe had to be
10 excavated by that date?

11 A Not that I recall. I can look through my
12 notes and see if I spot something.

13 Q Well, I've got something that may help you.
14 I think I buried the exhibit tab again.

15 Is 32 next?

16 THE REPORTER: 32.

17 MR. SLOME: What was 31? Sorry. I've got
18 Exhibit 31. It's the McLaren report.

19 (Plaintiff's Exhibit 32 was
20 marked for identification and is
21 attached hereto.)

22 BY MR. MILLER:

23 Q This is Exhibit 32.

24 A Thanks.

25 MR. SLOME: Thank you.

1 BY MR. MILLER:

2 Q This document is dated in 1985. And if you
3 look at the bottom of the page, in the letter to DTSC
4 concerning the spill of August 1985, it says
5 "Approximately 22 linear feet of piping displayed
6 severe corrosion to the extent that portions of the
7 pipe 'bottom' were missing."

8 Does that refresh your memory that the
9 problem with the pipe was fixed during an excavation
10 that occurred in 1985 so that you would not expect to
11 see that as a source to cause perched groundwater in
12 1990 or '91?

13 A I do see my entry regarding the date, the
14 9/6/85 memo. And if leakage from that line had been
15 sufficient to create a perched groundwater condition,
16 I would tend to agree with statements made by
17 Dr. Waddell that he would still expect that perched
18 groundwater to be present several years later.

19 Q Would you expect it to be as extensive six
20 years later as in 1985 when the condition was
21 discovered?

22 A If this condition had caused and was the
23 exclusive cause of a perched groundwater zone, I
24 would not, under that hypothetical. But I think
25 there would still be evidence of that condition and

1 evidence it's inconsistent with the boring logs.

2 Q You were just telling me, if I heard you
3 correctly, that you thought the pipe was leaking near
4 in time to the measurements in 1990 and 1991 in the
5 area of the anodic room. It's now been established
6 that the pipe was probably removed by 1985.

7 Isn't that inconsistent with your earlier
8 statement?

9 A I said a leaking pipe was identified near
10 the beginning of the subsurface excavation or
11 sampling activities at the site, which extended up to
12 and included the closure activities in May of 1991.

13 Q The point is, most of the sampling that you
14 are relying on to say there was no perched
15 groundwater occurred about four to five years after
16 the leakage from the pipe would have stopped,
17 correct?

18 A Most, yes. Not all, no.

19 The investigation by Bechtel and borings by
20 Bechtel at that location that extended down to the
21 zone of potential perched groundwater was one phase
22 of that; for example, in November 1986 where they
23 excavated a boring or borings down to the clay zone.
24 There's a very detailed log for these borings. It
25 described the soil type, consistency, moisture

1 levels. And it's very clear from those logs that
2 there's no perched groundwater present at the Y-1
3 location as of 1986.

4 Q And where were they boring on the property?

5 A That was near the anodic room at the
6 location of the concrete damage, or the apparent leak
7 at that location.

8 MR. MILLER: I want to mark the "Summary of
9 Groundwater Flow Model" document as the next exhibit,
10 33.

11 (Plaintiff's Exhibit 33 was
12 marked for identification and is
13 attached hereto.)

14 MR. MILLER: You can hand these out. Thank you.

15 Q You did a numerical model to try to predict
16 the effects of your recirculation well, and that's
17 what this document addresses, correct?

18 A Yes.

19 Q Did you use the same basin model that
20 Dr. Graham Fogg did?

21 A We started with the basin model, which I
22 assume is the same model that he started with.

23 Q Did you start with the version of it that
24 contained his modifications to the basin model?

25 A I don't believe so.

1 Q Did you make your own modifications to the
2 basin model?

3 A Yes.

4 Q Did you determine that the basin model was
5 well-calibrated by doing a scatter plot which
6 demonstrated that?

7 A With the adjustments that we made, we
8 obtained good correlation for both the steady state
9 and the transient flow conditions with the model.

10 Q And where does that scatter plot appear? I
11 know I've seen it, but I want to identify it for the
12 record.

13 A The steady state scatter plot is shown in
14 Figure 7 and the steady state comparison of predicted
15 and measured piezometric levels is shown in Figure 8,
16 and then a comparison of measured and predicted
17 groundwater level variations for the transient state
18 is shown in Figures 9, 10 and 11 for three different
19 wells.

20 Q Did you consider the data to have a good
21 fit --

22 A Yes.

23 Q -- to the transient data?

24 A Yes. I think the overall conclusion was
25 that there was a reasonably good fit between the

1 measured and predicted conditions.

2 Q So the basin model is a very good starting
3 point for modeling this aquifer, correct?

4 A As I recall, we did not get initially a good
5 match between predicted and actual piezometric
6 levels, and that some of the hydraulic properties or
7 characteristics of the model had to be adjusted in
8 order to get a good fit. I would say the basin model
9 was a good start and eliminated a lot of work that
10 otherwise would have had to have been done to get to
11 the point where we were doing what I would tend to
12 characterize a final calibration.

13 Q If you look at Figure 7, the data are
14 relatively close to the diagonal line across the
15 graph which is what tells you that there's a good
16 fit. The model is doing a good job of making
17 predictions, correct?

18 A I would agree with that.

19 Q Have you looked at a similar scatter plot
20 for the basin model without any modification?

21 A Not that I recall. I may have seen one, but
22 I don't recall it.

23 Q If that scatter plot showed the data tight
24 and close to the line just as this one does, that
25 would indicate unmodified the basin model has a

1 pretty good fit, correct?

2 A Potentially. I would have to look at that.

3 It would also appear to indicate an
4 inconsistency in the response that we got from the
5 model unmodified.

6 Q Do you have a printout of your scatter plot
7 with the model unmodified?

8 A No.

9 Q What did you change in the model? Is there
10 a narrative that describes it somewhere?

11 A It's discussed in summary form on page 4 of
12 9 near the top beginning with "The initial
13 assignment."

14 Q And do you believe that the changes to
15 boundary conditions described there are the only
16 changes you made?

17 A No. There were changes to the initial
18 hydraulic conductivity parameters to get a better
19 match between measured and predicted values.

20 Q What did you change it to?

21 A I don't know off the top of my head, but
22 that information should be contained in the files
23 that were produced by Mr. Colby.

24 Q Do you have a readme file that explains how
25 you changed the file for the basin model to create

1 your model?

2 A I don't.

3 Q Does Mr. Colby?

4 A I'm sure he could if I asked him to identify
5 in summary form the exact parameters that were
6 changed. Although if you look at Figure 6, this
7 shows the final hydraulic conductivity distribution
8 within the model. So if this were compared to the
9 original OCWD model, the changes that were made
10 during the calibration should be evident.

11 This is a black-and-white copy, at least
12 that I have. It's a little harder to read.

13 Q I will show you a color copy of Figure 6.

14 A Yeah, I don't need it as long as you have
15 one. I was just pointing out that the color copy
16 should be easier to read.

17 Q Okay. This shows that from The District's
18 recharge basins you have higher hydraulic
19 conductivity to the southwest, which would probably
20 represent the historical pattern of the way sediments
21 were laid down by the Santa Ana River.

22 A The higher velocity flows at least, they are
23 going to leave the coarser sediments that have the
24 highest hydraulic conductivities.

25 Q And that's shown in the darker blue?

1 A Yes.

2 Q So that shows that from the basins you tend
3 to get a southwesterly flow because there are coarser
4 materials to the southwest?

5 A Well, it at least implies that might be the
6 case, but you have to actually run the model and
7 incorporate the boundary conditions and the sinks and
8 the sources to see if that actually turns out to be
9 the case.

10 Q Well, the scatter plot data suggests that
11 that's true, correct?

12 A All the scatter plot does is compare
13 measured versus predicted values. It doesn't
14 indicate the direction of groundwater flow.

15 Q Well, it gives you the heads and when you
16 use the heads you get the direction of groundwater
17 flow.

18 A If you plot the heads and contour them, that
19 would give you the direction, yes.

20 Q That's the whole point of the model, the
21 flow model, is to calculate the head so you can
22 determine the direction of flow, correct?

23 A I suppose it depends what you are using the
24 model for, but that's typically a primary objective,
25 yes.

1 Q Okay. So you would expect that the primary
2 flow of groundwater from the basins shown on Figure 6
3 in blue and dark blue to be to the southwest. So it
4 dips down below 91 before Raymond Basin or at
5 Raymond Basin, correct? I'm referring to Highway 91,
6 of course.

7 A Yes. If you are talking about the zone of
8 highest permeability sediments, yes.

9 Q And that's where most of the flow would go?

10 A Again, that's one of the reasons why you run
11 the model to determine that. If there's a, if you
12 will, preferential flow pathway, that would like most
13 of the flow to go in that direction.

14 Q And when the isotope studies were done, you
15 reviewed those, correct?

16 A Yes.

17 Q Where they put isotopes that can be traced
18 in the environment, like oxygen 18 and xenon, it also
19 showed this southwesterly flow pattern.

20 A In general, yes, although as I recall, those
21 are primarily being traced within the principal
22 aquifer which doesn't necessarily have the same flow
23 pattern as the shallow.

24 Q Isn't this inconsistent with -- never mind.

25 At the end of your report at page 8 of 9,

1 you state "The average linear groundwater velocity
2 simulated in the shallow aquifer is approximately
3 4.5 feet per day," correct?

4 A Yes. This was at the location where we were
5 doing the recirculation well monitoring, not
6 basin-wide.

7 Q That's on the Northrop property?

8 A Yes.

9 Q And is it closest, just so the record is
10 clear, to Y-12?

11 A Is what closest to Y-12?

12 Q The recirculation well.

13 A Yes. It's on the Y-12, or former Y-12
14 property.

15 Q There's no recirculation well or other
16 groundwater remediation being conducted with respect
17 to EMD, correct?

18 A Not that I'm aware of.

19 Q None has ever been done, to your knowledge?

20 A Correct.

21 Q Now, you state at page 7 of 9 that the
22 recirculation model indicates a capture width of
23 approximately 175 feet upgradient.

24 A Yes.

25 Q The width would tend to narrow as you

1 approach the recirculation well?

2 A Yes.

3 Q So that would be the maximum width?

4 A I believe that reference is to the maximum
5 predicted width.

6 Q And I take it this model accurately reflects
7 the pumping pattern that was projected for the
8 recirculation well?

9 A I would say that it gets close, but I would
10 say that the actual zone of influence from the well
11 that we've seen throughout its operation is slightly
12 larger or wider than is predicted by the model. And
13 that's discussed, I think, in the Y-12 site summary
14 report.

15 Q If you look at page 7 of 9, you also state
16 "Particle tracking simulations" -- this is about five
17 lines from the bottom -- "predict that approximately
18 47 percent of groundwater is recirculation from lower
19 (injection) screen back to the upper (pumping) screen
20 interval. This is generally consistent with field
21 circulation (sic) measurements," correct?

22 A Yes. That's what it says.

23 Q Is that accurate?

24 A I guess it means or it depends upon what you
25 mean by "generally consistent." I would say yes,

1 it's probably accurate.

2 What's been measured, as far as the
3 recirculation percentage, is I believe it's
4 42 percent and what's predicted by the model here was
5 47 percent. So the model's predicting a slightly
6 higher rate of recirculation.

7 Q We'll take that as a range for the moment.

8 Doesn't that mean that the net pumping of
9 the well is something like 60 percent of the pumped
10 rate because of recirculation?

11 A As far as virgin groundwater, if you will,
12 that's being drawn into the well?

13 Q Yes.

14 A That's reasonable, yes.

15 Q If you multiply that pumping rate by
16 60 percent or so, something in that range, taking
17 into account the recirculation factor, how does that
18 compare to the extraction well pumping pattern in
19 terms of the amount of water treated?

20 A I'm not sure what you are asking.

21 Q You are familiar with The District's
22 extraction wells and Rob Greenwald's predictions on
23 how they need to be pumped over time to capture the
24 plumes?

25 A In general, yes.

1 Q How does that compare to the actual pumping
2 rate of virgin water, in this case contaminated
3 water, in the recirculation well?

4 A As I recall, the proposed extraction rate
5 from those wells was on the order of, oh, in round
6 numbers, perhaps 500 GPM to 700 GPM per well.

7 Q We'll accept that range.

8 How does that compare to the recirculation
9 well?

10 A It would be much higher.

11 Q Much higher than what?

12 A Than 60 GPM pump rate, or actually 65 I
13 think we're operating at now --

14 Q So the distance --

15 MR. SLOME: Let him answer the question. Okay.

16 THE WITNESS: -- versus, in round numbers, a 40
17 GPM extraction rate for virgin groundwater at the
18 circulation well, although we're somewhat comparing
19 apples to oranges since there are two different
20 mechanisms. As we discussed yesterday, The OCWD
21 wells are intended to at least attempt to establish
22 hydraulic control, and that's not the purpose of the
23 recirculation well.

24 BY MR. MILLER:

25 Q Basically the recirculation well is designed

1 to deal with less than a tenth the amount of water
2 that The District's extraction wells treat.

3 A It would process less than a tenth of what's
4 being proposed by The District.

5 Q Wouldn't that mean it would take ten times
6 longer to clean up an extraction -- strike that.

7 Wouldn't that mean it would take ten times
8 longer for the recirculation well to clean up the
9 same amount of groundwater as one of The District's
10 extraction wells?

11 A Not necessarily, no. If you look at the
12 efficiency of a well as a function of its pumping
13 rate, and we ran pump tests on the recirculation well
14 at flow rates up to 150 GPM, the radius of influence
15 that it has and the efficiency of the well drops off
16 due to hydraulic inefficiencies as you get to the
17 higher pumping rates. So it's not a linear
18 relationship where I can say the benefit that we get
19 from this well at 60 GPM is only half of the benefit
20 we get if it was being operated at 120.

21 Q Well, let's do it this way: Did you look at
22 the width of the capture zone of The District's
23 extraction wells and compare it to the recirculation
24 well, which is modeled at 175 feet, you said maybe
25 200 in the real world, in width?

1 A Perhaps even a little bit larger than that.

2 But in any event, it's going to be smaller than the
3 zone of influence, if you will, that would be
4 imparted by The District's wells.

5 Q Basically The District's extraction wells
6 are designed to capture and treat a larger volume of
7 water than the recirculation well, correct?

8 A Yes, I think that's a fair statement.

9 Q What is the cost of the recirculation well?

10 A What have we spent to date developing all of
11 the equipment and procedures that are used in it or
12 what's the cost --

13 Q I want the total cost, including whatever
14 environmental consulting services were involved, any
15 costs of construction, any costs of installation, any
16 cost of operation or maintenance. Do you know?

17 A I don't off the top of my head. It looks
18 like you got a copy of our invoice in front of you
19 that relate to our work on that project, and that
20 would include all of our costs associated with the
21 circulation well.

22 Q But you are not the only firm that worked on
23 it.

24 A Correct.

25 Q So this would only be part of the costs.

1 A Correct.

2 MR. MILLER: And I'll mark that document now.

3 (Plaintiff's Exhibit 34 was
4 marked for identification and is
5 attached hereto.)

6 BY MR. MILLER:

7 Q For consulting services alone, it was
8 \$463,000 plus change, correct?

9 A Yes and no.

10 Q That's what your records show your firm
11 billed for that activity.

12 A Yes. I should clarify, "consulting
13 services" include design, testing, fabrication of the
14 components as well under the term "consulting
15 services."

16 So this includes all of the bench scale
17 testing, all of the field testing, all of the design
18 activities, the fabrication of the advanced oxidation
19 treatment system, the installation of that system and
20 our participation in the operation of that system as
21 well as all of the laboratory analytical costs.

22 Q What other firms billed on the same project?

23 A Orion Environmental.

24 Q What firm did the drilling?

25 A I believe that was done by Cascade through a

1 contract with Orion Environmental.

2 Q They were a subcontractor?

3 A I believe so.

4 Q What other contractors or subcontractors
5 worked on the project?

6 A There was a company called APT that I
7 believe was a subcontractor to Orion, and there would
8 have been an analytical laboratory that we discussed
9 yesterday that would have been a subcontractor to
10 Orion.

11 Q Associated?

12 A Yes.

13 Q Have you done anything to total up all of
14 the bills associated with recirculation well?

15 A I don't know what Orion's total costs are,
16 if that's what you are asking, no.

17 Q Including the bills from the subcontractors?

18 A Including Orion's subcontractors. I should
19 say our -- included in our consulting are
20 subcontractors as well; the Exova lab costs, the rig
21 that we have used periodically to remove the advanced
22 treatment system from the well casing and any other
23 subcontractors that we've used are included in this
24 cost.

25 Q So do you have any estimate of the total

1 cost?

2 A No. I would have to get the numbers from
3 Orion. I don't know what their expenditures are.

4 Q And you've never been told?

5 A No, I don't believe so.

6 MR. SLOME: We've been going for about an hour
7 and a half. Is this a good time?

8 MR. MILLER: Yes, it is. I was about to change
9 subjects.

10 MR. SLOME: I figured.

11 THE VIDEOGRAPHER: We're going off the record.
12 The time is 2:28.

13 (Off the record.)

14 THE VIDEOGRAPHER: This now begins disk
15 number 4, Volume 2, in the deposition of Glenn
16 Tofani. We are now back on the record. The time is
17 2:42.

18 BY MR. MILLER:

19 Q Mr. Tofani, you came up with a critique of
20 the cost analysis done by Tetra Tech, correct?

21 A Yes. I don't know if I would necessarily
22 characterize it as a critique. But yes, I guess
23 that's fair, comparison or an evaluation.

24 Q Well, your evaluation is roughly half of
25 their estimates.

1 A Perhaps a little less on the maintenance
2 task but as far as the capital costs, yes.

3 Q Less than half on the maintenance.

4 A On O&M. I believe it was less than half on
5 O&M.

6 Q Did you obtain quotes from third parties for
7 the claimed cost of items that are purchased from
8 third parties?

9 A Typically, yes.

10 Q Is that identified in some way in the
11 report?

12 A Yes. I believe there are attachments that
13 show quotes from pump manufacturers and activated
14 carbon suppliers and ion exchange suppliers.

15 MR. MILLER: We'll mark as the next exhibit the
16 document entitled "Critical Review of Tetra Tech Cost
17 Estimates."

18 Q This is different than what I was given at
19 the beginning of the deposition?

20 A I think it's the same except for the title.

21 MR. SLOME: What number is it?

22 MR. MILLER: Exhibit 35.

23 (Plaintiff's Exhibit 35 was
24 marked for identification and is
25 attached hereto.)

1 THE WITNESS: It's just the cover page that's
2 different.

3 BY MR. MILLER:

4 Q Let's take the carbon cost.

5 What is your opinion for the costs of
6 appropriate carbon for this system?

7 A Those two are summarized -- the activated
8 carbon costs are summarized on page 2 of the table
9 entitled "Evaluation of Capital Costs of OCWD Seven
10 Well Recovery System." And it looks like for that
11 line item -- I've got a reduced scale table so it's a
12 little bit more difficult for me to read.

13 But it looks like our costs for that item
14 are identical, I believe, to the Tetra Tech cost
15 estimate at 1.665 million.

16 Q Is that for the carbon or the vessels?

17 A I believe that was for the vessels filled.

18 Q All right. For replacement carbon, where
19 is -- as part of the O&M cost.

20 A That would be in the other table, page 1 of
21 Table 2. There it looked like Tetra Tech had a cost
22 estimate of \$1.195 million per year, and our costs
23 were roughly 10 percent of that, much lower.

24 Q Why?

25 A Looking at the available data, I don't

1 believe the carbon usage would be anywhere as near
2 what is reflected by this number.

3 Q What is the cost per pound for carbon that
4 you used?

5 A It looks like a dollar 38 a pound.

6 Q And when did you get that estimate?

7 A November 21st, 2008.

8 Q Is that a current accurate estimate?

9 A This document is dated February 24th, 2009.

10 Q Who is it from?

11 A Oh, the estimate itself? Siemens.

12 Q Didn't Mr. Tedesco obtain a more current
13 estimate from Siemens that's significantly higher
14 than a dollar 38 a pound?

15 A I don't recall.

16 Q Do you know what's happened to carbon
17 tariffs that affected the price of carbon?

18 A The price of coconuts have gone up, I
19 understand.

20 Q No. We imposed a 60 percent tariff on
21 Chinese carbon that was flooding the market and
22 depressing prices. Do you know anything about that?

23 A I do recognize that activated carbon costs
24 have gone up somewhat in the last couple years.

25 Q Somewhat? What are current costs?

1 A I don't believe we're paying over \$2 a pound
2 for activated carbon.

3 Q So you would be surprised to hear that
4 Siemens' current quote is 2.20 a pound, 20 cents a
5 pound?

6 A Yes.

7 Q Why did you use an out-of-date estimate from
8 Siemens when Mr. Tedesco used a current estimate from
9 Siemens?

10 A We're reviewing a document that was prepared
11 in February 24th, 2009. This estimate was current
12 when this document was prepared.

13 Q Why didn't you update it?

14 A I've not completed my review and assessment
15 of the more recent Tedesco documents.

16 Q Didn't the cost of steel go up over the same
17 period of time?

18 A Not significantly, that I'm aware of.

19 Q Hasn't the cost of steel and cement been
20 affected by China significantly over the last several
21 years?

22 A The cost of cement has gone up as a result
23 of their infrastructure and dam construction
24 somewhat, but it's also been depressed to some degree
25 at the same time by the recession.

1 Q What date do you have for the cost of the
2 vessels?

3 A The carbon vessels?

4 Q Yes.

5 A I believe it's the same time period.

6 Q As?

7 A It's going to be late 2008 price quotes.

8 Q Do you plan to update this report to reflect
9 more current costs so that I would be wasting my time
10 to go through this?

11 A Yes to the first part and probably to the
12 second part.

13 Q The labor costs --

14 MR. SLOME: But you are going to waste your time
15 anyway.

16 MR. MILLER: There's a reason.

17 Q Are you familiar with the fact that
18 The District is required by law to pay prevailing
19 wage?

20 A That's my understanding, yes.

21 Q So whether they do the work in-house or out,
22 they may have to pay more than private parties would
23 that don't have to pay prevailing wages?

24 A Potentially.

25 Q Does that have anything to do with your much

1 lower estimate for the hourly cost of maintenance
2 workers and the total cost with a markup?

3 I'm looking at page 5 of the exhibit.

4 A Which line item? I'm sorry.

5 Q The -- well, we can start at item 20, the
6 plant operator.

7 A Okay.

8 Q In order to be the plant operator for this
9 plant, do you have to be certified by the state to a
10 certain grade?

11 A I don't know if that's something that the
12 state would require.

13 Q What is the normal certification required
14 for a water treatment operator who is acting as the
15 primary person responsible for the project and
16 supervises others?

17 A I haven't seen any state requirements in
18 that regard for this type of system.

19 Q What is the normal certification that you
20 use for treating water? Any, do you know?

21 MR. SLOME: Objection; vague and ambiguous,
22 assumes facts.

23 THE WITNESS: Are you talking about a
24 groundwater remediation system or are you talking
25 about a water treatment system that's being used to

1 generate potable water for sale?

2 BY MR. MILLER:

3 Q Is there any requirement by the state
4 applicable to groundwater treatment systems that are
5 not used to generate potable water?

6 A Not that I'm aware of.

7 Q If The District uses a certified operator,
8 what would the grade be, fitting the description I
9 just mentioned?

10 A I don't know.

11 Q Is the cost of 90,000 a year sufficient to
12 cover a certified operator?

13 A I would hope so.

14 Q Do you know what they're paid?

15 A I don't know what The District pays its
16 certified operators.

17 Q Do you know what anyone in Orange County
18 pays certified operators, grade 4 or 5?

19 A We have personnel that work for GeoKinetics
20 that operate systems not of this size but water
21 treatment systems, extraction treatment systems, that
22 are not paid anywhere near that salary. I know many
23 other consultants have people that perform similar
24 tasks that are not paid anywhere near that salary.

25 Q And do they operate systems that use ozone?

1 A In some instances they have, yes.

2 Q Have there been some well-known incidents
3 involving ozone where there were hazards involved,
4 including wells blowing up?

5 A There are hazards with ozone. I don't know
6 of well explosions.

7 Q Casings coming out of the ground?

8 A Not that I know of. I'm not saying they
9 don't exist, I'm saying I'm not familiar with them.

10 Q Ozone systems have unique hazards and you
11 have to have an experienced person to know how to
12 prevent accidents involving that chemical, correct?

13 A Yes. It's potentially toxic. There are
14 hazards with it.

15 Q Are you --

16 A We were discussing this, though --

17 I'm not sure of the relevance because this
18 system doesn't involve ozone that I recall.

19 Q What is The District using besides
20 ultraviolet light and carbon?

21 A Hydrogen peroxide.

22 Q Does hydrogen peroxide have hazards?

23 A It has to be handled carefully. It can
24 cause burns. It can release oxygen which can cause
25 problems as well.

1 Q Hydrogen peroxide in its pure form as used
2 by The District is a solid or a liquid?

3 A The hydrogen peroxide that is normally
4 supplied is typically supplied as a liquid and not in
5 pure form. Usually at a concentration of 30 to
6 40 percent it becomes unstable in its pure form. In
7 fact, it was used by the Germans as rocket fuel in
8 its pure form during the second World War II.

9 Q As an oxidant?

10 A Yes, with alcohol.

11 Q At item 21 you say the markup rate is high?

12 A Yes.

13 Q Are you applying your own markup rate of
14 40 percent?

15 A In this estimate?

16 Q Yes.

17 A Yeah. We used the 40 percent markup in this
18 estimate.

19 Q Do you know what The District's employees
20 receive in the way of benefits?

21 A No.

22 Q Is that the markup that was used?

23 A What do you mean?

24 Q No. The 65 percent, do you know if they
25 were using pensions, medical benefits, vacation

1 benefits and assigned support staff and office costs
2 to do the markup?

3 A I don't believe that's set forth in their
4 estimate that I reviewed.

5 Q Do you know where they got the 65 percent
6 from?

7 A No.

8 Q So how do you know if it's wrong if you
9 don't know what the components are?

10 A I know what a typical reasonable markup is
11 that I see in this capacity.

12 Q Do you know what The District has to pay its
13 employees under the agreement with its employees?

14 A No.

15 Q If The District has decided to use its own
16 employees, would it be appropriate to use their
17 actual benefit costs?

18 A I'm hesitating in that inherent in that
19 question it assumes that it's reasonable for
20 The District to use its own employees.

21 Q Well, are you going to tell them who to use
22 to do this project?

23 A If their markups are realistically this
24 high, it may not make economic sense for them to use
25 their own employees if they could outsource it more

1 economically.

2 Q To do that they have to go to bidding,
3 correct?

4 A I don't know if they could sole source this
5 or not.

6 Q They would normally have to sole source
7 contracts involving professional services -- well,
8 strike that.

9 Do you know if The District has ever sole
10 sourced a contract of this type?

11 A I don't.

12 Q Do you know what the costs The District has
13 paid after bidding for this type of service?

14 A When they've outsourced it? No.

15 Q Are you familiar with The District's
16 participation in the cleanup program they call the
17 DeSalter project?

18 A No.

19 Q Do you know what their costs are?

20 A The District's? No.

21 Q Do you know what the costs of the DeSalter
22 project are?

23 A No.

24 Q Have you ever assisted the Orange County
25 Water District with any type of estimate before?

1 A Not that I can think of.

2 Q Are you a cost estimating engineer?

3 A I perform cost estimates almost every day.

4 Q You are familiar with the fact that within
5 the discipline of civil engineers there are cost
6 estimating engineers that are specialists in that
7 field and have special certifications and continuing
8 education programs?

9 A I'm not familiar with a category cost
10 estimating engineer, no.

11 Q Is there a professional society for cost
12 estimating engineers?

13 A Not that I'm familiar with.

14 Q And certainly you are not a member of one?

15 A No.

16 Q Do you know Mr. Tedesco?

17 A No.

18 Q Do you know if he has specialization in the
19 field of cost estimation?

20 A I'm not familiar with his background.

21 Q Are you a specialist in that field?

22 A I would say yes. I'm a licensed contractor.
23 I own a company that provides construction services.
24 As I said previously, I, in that capacity, am
25 involved in cost estimating on construction projects

1 on a daily basis.

2 Q At page 10, at the bottom --

3 A Yes.

4 Q -- Tetra Tech has the cost of construction
5 or capital cost at 42.7 million and your estimate is
6 20.4.

7 A Yes.

8 Q At page 5 of the exhibit, for O&M,
9 Tetra Tech estimates the O&M cost at 5.6 million.
10 You estimate it at 1.8.

11 A Yes.

12 Q Substantial differences.

13 A Yes.

14 Q So your firm would be willing to sign a
15 contract at a fixed price to do all of this work for
16 less than half the cost Tetra Tech estimates it will
17 take to do the job consistent with The District's
18 requirements?

19 A I would be happy to provide an estimate for
20 the current system to do that.

21 Q And can your firm take the \$20 million loss
22 on capital costs if you are wrong?

23 A Probably not.

24 Q Tetra Tech is a somewhat larger firm?

25 A Yes.

1 Q Substantially larger?

2 A I don't know their full size, but probably,
3 yes.

4 Q When you did your cost estimate, did you
5 attempt to use the same materials and quality of
6 materials that Tetra Tech did?

7 A We tried to use like-in-kind comparable
8 components.

9 Q You have an estimate for a variable speed
10 drive pump for a well that's substantially different
11 than theirs. Look at page 2, item 6.

12 A Yes.

13 Q 1,125 gallon-per-minute pump and motor with
14 a variable speed drive you estimate at a total cost
15 of 35,000 and they estimate it at 120-?

16 A You are at item 6, did you say?

17 Q Yes.

18 A Yes.

19 Q That's not the kind of difference you see
20 for the same equipment, is it?

21 A It's a fairly large difference in estimated
22 cost.

23 Q Yes.

24 If you went to two vendors for the same
25 equipment, you would not get two numbers in that

1 range of difference?

2 A Well, it's not just a single piece of
3 equipment. It's an assembly with an installation
4 cost.

5 Q Did you compare what Tetra Tech selected as
6 the appropriate equipment and make sure that you
7 developed an estimate for a similar piece of
8 equipment with respect to this item?

9 A I believe so. We took the specifications
10 that were available in the Tetra Tech estimate and
11 got cost estimates from suppliers for equipment with
12 the same specifications.

13 Q Okay. Where is that in your backup?

14 A The pump costs estimate looks like it starts
15 on A-19, page A-19.

16 Q Why did you white out part of page A-19?

17 A What makes you think part of A-19 has been
18 whited out?

19 Q It may be because I have the original.

20 If that isn't Wite-Out, I don't see it a lot
21 these days, but it sure looks like Wite-Out to me.
22 If it isn't, it's tape.

23 A Yeah. I believe it is tape, and I don't
24 know. It looks like it just indicates that it was
25 submitted to us and it's got our fax number on it.

1 Q Your figure is for a 750 gallon per minute
2 variable frequency drive equipment.

3 I'm looking at page A-19, if that helps you.

4 A I know there were separate estimates
5 obtained for each of the different size pumps that
6 was specified.

7 The larger pump, 1100 GPM, is A-1 through
8 A-4. And beginning at A-5 there's a different size,
9 a smaller pump, 800 GPM. Beginning at A-8 is a 625
10 GPM pump.

11 Q At A-1 I see a motor with 100 horsepower,
12 correct? Could you just turn to Shaw Pump & Supply,
13 page A-1?

14 A I'm at page A-1.

15 Q It says for 100 horsepower motor.

16 A Yes.

17 Q Third item.

18 A Yes.

19 Q So where is the page for a 1,125 horsepower
20 motor?

21 A There's no component that's specified with
22 1,125 horsepower. That would not fit down a well
23 casing.

24 Q Paragraph 6, "Furnish and install 1,125
25 gallon per minute pump and motor for Well #1."

1 A Yes. 100 GPM -- I'm sorry. A 100
2 horsepower pump, which is spec here, is a 1,125 GPM
3 pump, not 1,125 horsepower.

4 Q Okay. Do you think you can attain a
5 125 gallons per minute from the well -- the
6 extraction well designed by The District that would
7 pump 1,125 gallons per minute with a variable speed
8 drive?

9 A Yes. I believe this pump would work. The
10 flow curve for the pump is provided on page A-4. I'm
11 looking at the flow curve. It's 100. So at --
12 depending upon which 100 horsepower model's been
13 specified, this pump will move specified capacity of
14 water at a head of approximately 300 -- no, order of
15 300 feet of head.

16 Q With a significant loss of efficiency over
17 125 horsepower motor according to this chart,
18 correct? You get higher efficiency with 125?

19 A Slightly, yes.

20 Q You can pay for a pump with the cost of
21 electricity from a project like this?

22 A The cost between a 100 and 125 horsepower
23 motor is going to be nominal.

24 Q Yes. But the loss of efficiency and the
25 increased cost of electrical power consumption can be

1 significant over a long period of time, correct?

2 A Potentially.

3 Q Did you compare the change in electrical
4 consumption costs with lower horsepower motor?

5 A We calculated the electrical consumption
6 costs for the components that were specified.

7 Q Which pump did you select from Shaw Pump &
8 Supply?

9 A For the high-capacity pump, it's specified
10 as a Model 1100S1000-2.

11 Q And where does that appear on the pump
12 efficiency charts?

13 A It's the lower of the curve for the 200
14 horsepower models that are presented.

15 Q Which curve? There's more than one. I see
16 more than one performance curve.

17 A It's labeled as "1100S1000-2."

18 Q Yeah, which -- I'm sorry, page A what?

19 A Oh, 4.

20 Q 1100S what?

21 A 1000-2.

22 Q So on the pump efficiency rating, that's the
23 fourth item down?

24 A Yes.

25 Q And three other pumps are rated with higher

1 efficiencies?

2 A Yes.

3 Q And the one labeled most efficient range,
4 600 to 1400 gallons per minute, is 125 horse pump at
5 the top?

6 A Yes.

7 Q And you didn't select it?

8 A Correct. That's not what was costed.

9 Q So electrical efficiency wasn't important in
10 your selection?

11 MR. SLOME: Objection; misstates the testimony,
12 argumentative.

13 THE WITNESS: It was considered in the cost.

14 BY MR. MILLER:

15 Q Is it fair to say you did not consider
16 The District's actual labor costs for its employees
17 and markups at all in doing your estimate?

18 MR. SLOME: Asked and answered.

19 THE WITNESS: I considered what I believed to be
20 typical and reasonable costs for the skills of a
21 person who had the capabilities to operate this type
22 of system.

23 BY MR. MILLER:

24 Q Item 17, resin, you provided for onsite
25 regeneration for the brine?

1 A You are in the capital costs or the O&M?

2 Q O&M, paragraph 17. You have a significantly
3 different estimate than Tetra Tech. They are at
4 1.478 million and you are at 200,000 a year.

5 A Yes.

6 Q Did you change their estimate of the amount
7 of brine that needs to be disposed of each day at
8 15,000 gallons per day?

9 A That's a different line item, line item 18
10 you are referring to now?

11 Q No, I'm not talking about the brine disposal
12 fee. I'm talking about the volume of brine which is
13 the fourth line up from the bottom of paragraph 17.

14 Did you agree with their estimate on the
15 amount of brine in gallons each day that needed to be
16 dealt with as a part of this project? They had it at
17 15,000 gallons, or do you?

18 A I believe they had it at 179,264 gallons of
19 water that they were going to backflush and basically
20 put down the sewer per day.

21 Q To dispose of the brine?

22 A Yes.

23 Q How are you going to separate the brine from
24 the water?

25 A I'm not sure what you are asking.

1 Q You propose a regenerative salt and filter
2 media disposal replacement?

3 A Yes.

4 Q That's onsite regeneration of the brine?

5 A Yes.

6 Q You don't propose to dispose of the water
7 containing brine at all. You want to regenerate?

8 A The water containing brine would be disposed
9 of, but the quantity is much lower, about 90 percent
10 lower than their estimate.

11 Q So did you include both the disposal cost
12 and the cost of operating onsite regeneration?

13 A The disposal cost is covered under item 18.

14 Q Is there a reason that people tend not to
15 use onsite regeneration of brine and salt?

16 A It generates a lot of wastewater.

17 Q Any other reason they tend not to do onsite
18 regeneration?

19 A It takes space, it's labor intensive.

20 Q You are going to cover both regeneration and
21 the cost including labor for 200,000 a year?

22 A Not including brine disposal, yes.

23 Q Why is your estimate so much different than
24 Tetra Tech's for the same item?

25 A I believe their values are high. Their

1 costs are high.

2 Q They have backup for their costs, correct?

3 They told you exactly where they got their numbers

4 from and they supplied third-party figures?

5 A Not in all cases, no.

6 Q They did here.

7 A I don't believe there's backup for all of

8 their numbers. I think some of them are subjective

9 based on overly conservative operating assumptions.

10 Q Did you assume that the extraction wells

11 would operate at lower rates?

12 A No.

13 Q That the concentrations of contaminants in

14 the extraction wells would be different?

15 A Different from what?

16 Q From what they estimated.

17 A My estimates of what would be contained in

18 the extraction wells was based on the pump tests in

19 the summary table I gave you yesterday. I don't know

20 if it was identical to theirs. I believe they were

21 conservative in some of their contaminant

22 concentration assumptions, particularly with respect

23 to carbon loading.

24 Q What do you mean by "carbon loading"? Are

25 you talking about carbon utilization?

1 A Yes.

2 Q Aren't there standard figures available on
3 carbon utilization rates in the published literature?

4 A As far as the absorption capacity of the
5 carbon, yes.

6 Q Did you take into account total organic
7 carbon in your estimates?

8 A In the effluent water or influent water?

9 Q In the influent water.

10 A Yes. All of the water analytical data that
11 was available was provided to Siemens and other
12 parties, as I recall, to provide estimates on the
13 activated carbon performance and what would be
14 required for this project.

15 Q So how did you get different numbers out of
16 Siemens than Tetra Tech did? Did you change the
17 information given to them?

18 A Well, as far as the activated carbon
19 installation costs and the vessel costs, which we
20 looked at first, I believe the estimates were
21 identical in that regard.

22 Q For Tetra Tech and your firm?

23 A Yes.

24 But as far as how long the carbon would last
25 and how often it would have to be replaced, I think

1 they were replacing it much more often than we were.

2 Q But the carbon cost that Tetra Tech used
3 came from Siemens.

4 A As far as the replacement cost?

5 Q Yes.

6 A As did ours.

7 Q So how did Siemens come up with two numbers
8 this far apart? Didn't you give them different
9 information than Tetra Tech did on how the system
10 would be operated and what it would have to deal with
11 in terms of contaminants?

12 A No, I don't believe so.

13 Q You are claiming that Siemens gave two
14 disparate numbers with the same information?

15 A We provided them with The OCWD extraction
16 well testing results and other water quality data.

17 Q Did you check to see if you provided them
18 with the same information that Tetra Tech did?

19 A I don't recall.

20 Q Well, if your estimate is at 1 -- I'm sorry.

21 If your estimate is at 200,000 a year and
22 their estimate is at 1.478, wouldn't you want to
23 check to see why the numbers are different?

24 A I'm sure we checked the numbers.

25 Q Why are they different?

1 A I believe that their carbon loading rate
2 that they assumed is too high.

3 Q Did they get it from Tetra Tech -- sorry.

4 Did they get it from Siemens?

5 A It looks to me --

6 I'm looking at the notes on pages 2 and 3.

7 It looks to me like they were assuming that they
8 would not be removing any of the VOCs with the
9 advanced oxidation system and that all of the VOCs,
10 or the vast majority of the VOCs would have to be
11 removed by the activated carbon.

12 Q What do you base that on?

13 A My recollection is that is how they had set
14 up their treatment train.

15 Q In what sequence?

16 A Activated carbon followed by advanced
17 oxidation.

18 Q Do you know if they did cost analysis on
19 whether or not that was the most appropriate
20 sequencing?

21 A I don't recall off the top of my head. That
22 would not be the most appropriate sequencing.

23 Q What would be?

24 A The other way around.

25 Q Have you done a cost analysis on that?

1 A I looked at the cost options under both
2 scenarios. If you put the advanced oxidation first,
3 it takes the exact same amount of electricity to run
4 the advanced oxidation system, or at least similar
5 amounts, whether it's before or after the activated
6 carbon. The power to operate the UV lamp is the
7 same. If you put it in front of the activated
8 carbon, you can eliminate the vast majority, probably
9 90 percent plus of the VOCs from the waste stream
10 with the advanced oxidation system, and that
11 dramatically reduces the carbon loading.

12 I believe they -- from my recollection, they
13 were running the waste stream through the activated
14 carbon first and then through the advanced oxidation
15 system second.

16 Q Did you check that and make sure that was
17 the sequence?

18 A I believe that was the initial sequence. I
19 would have to look at their documents, their initial
20 documents, but I believe that was the sequence. I
21 believe that may have been reversed in their more
22 recent design.

23 Q So you haven't done an estimate with the
24 more recent design?

25 A Correct.

1 Q Who operates a regeneration system for brine
2 for \$200,000 a year?

3 A That was an estimate we obtained from
4 Purolite, one of the media suppliers.

5 Q Does that cover the labor cost?

6 A It was a cost that they said they would
7 provide that service for.

8 Q Where is that?

9 A I see one estimate on page A-81.

10 Q Isn't this for perchlorate at page 81?

11 A The second paragraph talks about the nitrate
12 removal after the perchlorate.

13 Q Did you use those numbers?

14 A I don't recall if these were the numbers
15 that were used or if we had another bid off the top
16 of my head.

17 Q That document in the paragraph you
18 identified says "The budget price for the nitrate
19 removal system would be 1.4 million," which is much
20 closer to Tetra Tech's number of 1.478 than your
21 200,000.

22 A We did use 1.4 million in our estimate in
23 Table 1, page 2, as for the capital costs that they
24 are referencing.

25 Q Did you use the \$360,000 number they

1 reference for the costs of replacement resin?

2 A My recollection is we talked to them about
3 the treatment standards and the percentage of the
4 flow that could be slip-streamed, that that number
5 was adjusted downward. And I believe that's where
6 the 200,000 estimate came from.

7 Q Turn to page A-74.

8 A Got it.

9 Q A little over halfway down it says "Please
10 note that using the ultraviolet/OX" --

11 I guess that's hydrogen peroxide?

12 A Ultraviolet advanced oxidation system.

13 Q -- "installed upstream of the liquid
14 granular activated charcoal system can produce
15 operational issues. Specifically, the peroxide can
16 result in oxygen pockets within the GAC bed. These
17 oxygen pockets can cause air-binding which could lead
18 to excessive pressure drop or potentially cause
19 channeling."

20 Are you familiar with that issue?

21 A I'm familiar with that potential, yes.

22 Q Channeling is a way to effectively bypass
23 efficient carbon sorption?

24 A Yes.

25 Q Which could lead to a premature change-out

1 of the carbon?

2 A Yes.

3 Q Higher carbon utilization?

4 A If it occurs, yes.

5 Q Do you know if the residual peroxide going
6 through the carbon bed would use up carbon?

7 A There would be no residual peroxide going
8 through the carbon bed. That's how this issue would
9 be resolved.

10 Q They state "Residual peroxide concentration
11 is the primary component which influences the amount
12 of oxygen released within the carbon bed."

13 A Yes. You would not --

14 Ideally you would not want to have residual
15 peroxide going into the GAC filters. But then the UV
16 system can be easily configured -- in fact, the
17 intent of the UV system is to configure it so that it
18 completely destroys all of the peroxide. That's how
19 it's set up with the recirculation well. There's no
20 peroxide in the effluent from the system.

21 Q When are you going to finish your work on
22 updating your estimate?

23 A I would expect to do that before the next
24 session of my deposition.

25 Q How long is that going to take? In other

1 words, if I reset the deposition in a week, is that
2 too soon to get this work finished so that I have it?

3 A I believe this is something that I can
4 probably do in two or three days. The trick is going
5 to be finding two or three days to do it.

6 Q Yes. Well, given the fact that life is what
7 it is, when do you think you will be done?

8 A I think I could have it done in two weeks.
9 I can have it done sooner if it needs to be done
10 sooner. It's partially dependent upon the schedule
11 of upcoming trials.

12 Q Other than this one?

13 A All of the above.

14 Q How much has your firm been paid for work on
15 this case?

16 A There should be another invoice that goes
17 with this one that covers the remainder of the scope.

18 And in your question, I assume you are
19 including costs to subcontractors that were paid to
20 us that we paid subcontractors?

21 Q I'm concerned that the definition in that
22 particular document is too limited.

23 Could you hand it back to me so I can mark
24 it as an exhibit?

25 A Sure.

1 (Plaintiff's Exhibit 36 was
2 marked for identification and is
3 attached hereto.)

4 BY MR. MILLER:

5 Q Exhibit 36 is entitled "Expert Designation
6 Assignment," and it totals \$280,000 plus change,
7 correct?

8 A Yes.

9 Q I want to know the total amount Northrop or
10 its attorneys have paid you with respect to this case
11 regardless of what it was for.

12 MR. SLOME: I object. To the extent that he's
13 been paid fees for consulting services, that's
14 privileged information, and we're not going to
15 disclose it.

16 MR. MILLER: It goes to bias. I've never heard
17 a lawyer instruct an expert not to disclose the
18 amount paid in a case. This will be a first. I
19 don't know of any appropriate legal basis for that
20 claim.

21 MR. SLOME: I'm happy to take that under
22 submission, and we can address it at the next
23 session.

24 MR. MILLER: No. We're going to get it resolved
25 by a judge before the next session, the whole

1 consulting issue.

2 MR. SLOME: Then we'll get it resolved before a
3 judge, the next issue.

4 MR. MILLER: Because you are instructing him not
5 to answer at this time, so I will take that question
6 to him.

7 MR. SLOME: I'm instructing the witness not to
8 answer questions that relates to his consulting
9 services which go beyond the scope of his designation
10 and which are subject to a privilege, and the
11 privileges aren't defeated by relevance.

12 And you are telling me it's relevant. Well,
13 so what? If it's privileged, it's privileged. And
14 certainly the services he performed and the work he's
15 done in a consulting capacity are privileged. I
16 think that the fees he's been paid for those services
17 are also privileged, but -- and on that basis I'm
18 giving him the instruction, but I'm prepared to take
19 a look at that issue.

20 MR. MILLER: Take a look at it soon, please,
21 because I do not want to file an unnecessary motion.

22 MR. SLOME: Sure.

23 MR. MILLER: But based on what happened in day
24 one, I have to anyway. The question is the scope of
25 the issues. I don't want the judge spending time on

1 something he or she shouldn't.

2 Please mark that.

3 THE REPORTER: Okay.

4 BY MR. MILLER:

5 Q I have a document entitled "Kester Solder
6 Site Assessment Summary," dated March 13, 2012.

7 Can you check it and make sure that's the
8 full document I should use and mark as an exhibit as
9 your summary of opinions concerning that site?

10 A Yes, I believe it is complete.

11 Q Okay. I'm going to need to get these maps
12 out of the way temporarily so I can find my copy of
13 this document.

14 I've marked the document identified by the
15 witness Exhibit 37.

16 (Plaintiff's Exhibit 37 was
17 marked for identification and is
18 attached hereto.)

19 BY MR. MILLER:

20 Q This is a copy of your summary.

21 A Thanks.

22 MR. SLOME: Can I see if I've got the same
23 document? Yes. Okay.

24 BY MR. MILLER:

25 Q Exhibit 37 is your summary of Kester

1 opinions, correct?

2 A Yes.

3 Q Please turn to page 20.

4 A I'm sorry?

5 MR. SLOME: Page what?

6 BY MR. MILLER:

7 Q I'm sorry. Paragraph 20, page 5.

8 A Yes.

9 Q You state "The groundwater VOC levels within
10 the perched zone have decreased significantly in
11 response to soil and perched zone remediation
12 activities, although elevated levels still remain,"
13 correct?

14 A Yes.

15 Q Doesn't that finding mean that you have
16 determined that the VOCs released at the site have
17 reached groundwater?

18 A Groundwater including the perched zone as
19 you are asking the question?

20 Q No. It says -- oh, I see.

21 Has the amount of VOCs in groundwater
22 decreased following remediation of the Kester Solder
23 site?

24 A Yes.

25 Q Do you believe that's attributable to the

1 decline in VOC concentrations in the perched zone as
2 a result of remedial activities?

3 A In your prior question when you asked me
4 about groundwater, I was using that in the broad
5 sense, including the perched zone as well.

6 Q I'm less interested in the perched zone at
7 the moment. I'm talking about groundwater, not
8 perched groundwater.

9 Can you make that distinction?

10 A Yes. You are talking about the shallow
11 aquifer.

12 Q Yes.

13 Has the concentration of VOCs in
14 groundwater, including the shallow aquifer, declined
15 as a result of the remedial efforts at the site to
16 reduce the level of VOCs in the perched zone?

17 A Yes.

18 Q So you agree with the premise that VOCs were
19 released at the site that contaminated the shallow
20 aquifer at the Kester site, correct?

21 A I believe that the shallow aquifer was
22 impacted by PCE for a period of time. It was
23 released at the Kester site.

24 Q In fact, there was a period of time when
25 Northrop was claiming there was an upgradient source

1 of VOCs causing contamination entering the Y-12
2 upgradient monitoring wells and that it was coming
3 from Kester?

4 A There may have been VOCs. In fact, it's
5 likely that there were some VOCs from Kester that
6 reached the Y-12 property. I think we talked about
7 this yesterday.

8 There were other sources further upgradient,
9 upgradient of Kester, that have also contributed VOCs
10 to the Y-12 site.

11 Q But the identified source of PCE in
12 upgradient monitoring wells coming onto the Y-12 site
13 is Kester Solder?

14 A I don't believe it's the sole upgradient
15 source of PCE.

16 Q It's the major source, correct?

17 A I would have to look at the plume map data
18 to evaluate that question. I don't know the answer
19 off the top of my head.

20 Q Dr. Waddell determined that the major source
21 of PCE coming on the Y-12 property was Kester Solder,
22 correct?

23 A I believe that's consistent with what he
24 said.

25 Q Do you agree or disagree?

1 A I have to look at the data on the plume
2 maps.

3 Are we still on the record?

4 I would not reach that same conclusion based
5 on the available groundwater data.

6 Q What are you relying on?

7 A One of the plume data maps that we
8 referenced yesterday. I can put it up on the table
9 if you would like.

10 Q I need a document and a page.

11 A It's entitled "Groundwater PCE Data for
12 Upper Shallow Aquifer through Spring 2011."

13 Q And what are you looking at?

14 MR. SLOME: He'll show you.

15 BY MR. MILLER:

16 Q Do you fold road maps that way?

17 A Trying to get it down to a more manageable
18 size.

19 Q Thank you. I do appreciate that.

20 A This is similar to a couple of maps that we
21 looked at yesterday. It contains the maximum
22 historic PCE level for the monitoring wells in the
23 vicinity of Y-12, Kester and some upgradient sites,
24 as well as the most recent PCE concentration
25 measured. And this is for the upper shallow portion

1 of the aquifer.

2 Q You have a contour in yellow?

3 A Yes.

4 Q What is the beginning point of the contour
5 in yellow?

6 A On the upgradient end?

7 Q Yes.

8 A It extends just to the east a few hundred
9 feet of monitoring well FM-5.

10 Q What site is in that area?

11 A It extends up to the vicinity of the
12 Fullerton Business Park.

13 Q And what is the concentration upgradient of
14 Kester Solder for PCE?

15 A The most recent data indicates
16 concentrations ranging from 74 micrograms per liter
17 to 19 micrograms per liter, the "19" being more
18 current than the "74."

19 Q And what monitoring point are you looking
20 at?

21 A I was looking at a well that's designated
22 KS-GW1.

23 Q And that's a Kester Solder monitoring well?

24 A The "KS" prefix suggests that, but I don't
25 know that that was necessarily installed by Orion.

1 Q And where did that PCE come from?

2 A It appears to be originating in the area
3 that I just described, to the east of FM-5.

4 Q Fullerton Business Park?

5 A That general area, yes.

6 Q Let's go back to the summary of your
7 opinions, Exhibit 37.

8 Number 22, "The circulation well that is
9 being operated at the Y-12 site will intercept a
10 portion of any VOCs that were previously released to
11 the shallow aquifer at the Kester site."

12 What does "a portion" mean?

13 A It means likely, not all.

14 Q I wouldn't defer with that.

15 But what is it? Are we talking 5 percent,
16 50 percent?

17 A I would say potentially approximately half
18 of the VOCs that are present between Kester and the
19 recirculation well that would otherwise migrate
20 downgradient to the location of the recirculation
21 well.

22 Q Did you get that answer through modeling?

23 A I just referenced Exhibit 33 and the
24 predicted capture efficiency for the upper shallow
25 aquifer as a whole in responding to your question.

1 Q Is the Kester plume less than 200-feet wide
2 as it approaches Y-12 in the recirculation well?

3 A It does not appear to be very wide. It
4 appears to be on that order width.

5 Q What happens when the direction of
6 groundwater flow shifts as far as the ability of the
7 recirculation well to pick up that plume from Kester?

8 A If it were to shift significantly after a
9 period of time, perhaps a year or two, the
10 recirculation well may no longer be within the shadow
11 of that plume, but --

12 Q If you fail to capture any of it?

13 A The available data, if you look at the
14 groundwater monitoring well results, suggests that
15 there's no longer a perceptible contribution of VOCs
16 to the shallow aquifer from Kester. So what remains
17 between Kester and Y-12 is the vast majority, if not
18 all, of the VOCs that would be in question as far as
19 being intercepted by the recirculation well.

20 Q In paragraph 20 in the summary of your
21 opinions, you state there are still elevated levels
22 in the perched zone of groundwater VOCs.

23 A Yes.

24 Q And contaminants in the perched zone at the
25 Kester site would make their way to groundwater?

1 A They could.

2 Q Historically they have.

3 A In the past, yes.

4 Q Nothing's changed about the ability of VOCs
5 in the perched zone and their ability to get into
6 deeper groundwater, correct?

7 A In the short term, yes. Perhaps not in the
8 long term, but that's unclear.

9 Q What is being used to remediate the perched
10 zone contamination at Kester Solder?

11 A There's been pilot tests of two different
12 approaches; one a dual-phase extraction system and
13 one a potassium permanganate in situ oxidation
14 system.

15 Q How long has that been operational?

16 A Both of them were pilot tests. Neither one
17 is what I would characterize to be an operational
18 system.

19 Q The SVE system at the site was shut down?

20 A The soil remediation activities were
21 completed, and the SVE system was shut down at the
22 completion of those activities.

23 Q In June of 2009. Paragraph 13.

24 A Yes.

25 Q They estimate there were 990 pounds of VOCs

1 in the vadose zone they recovered with the SVE
2 system?

3 A Yes.

4 Q And that was predominantly PCE?

5 A Yes.

6 Q Was there any amount of TCE or DCE released
7 at the site?

8 A There were lower levels of TCE and DCE
9 present in the subsurface, most likely as a result of
10 the PCE. I'm not aware of any documentation that
11 would suggest that those VOCs were released directly.

12 Q Paragraph 17 --

13 A Yes.

14 Q -- it states "Relatively high groundwater
15 levels persist at the site in response to OCWD's
16 recharge activities. It is likely that dual-phase
17 extraction would be ineffective at these high
18 groundwater levels."

19 Is that statement true?

20 A I believe it to be true.

21 Q So if that's true, you would have to go with
22 the ozone system, correct?

23 A No. You are referring to the in situ
24 oxidation, potassium permanganate.

25 Q That's what you are going to use?

1 A That I think is an alternative. It's not up
2 to me.

3 Q Why would you use potassium permanganate
4 instead of ozone?

5 A Because that approach has been proven to be
6 effective as far as injecting it into relatively low
7 permeability deposits.

8 Q The PCE at this site is in low permeability
9 deposits, which makes it hard to get at and
10 remediate?

11 A Yes.

12 Q It acts kind of like a bank holding and
13 releasing PCE over long periods of time?

14 A Yes.

15 Q How long does it take to get all of the PCE
16 out of a low permeability unit using potassium
17 permanganate?

18 A Well, the pilot tests that were performed in
19 localized areas, they were able to effectively remove
20 the vast majority of the PCE in a period of a few
21 days to a few weeks, but that was within a localized
22 area.

23 Q Basically the injection point?

24 A They injected in one well and extracted in
25 another well that was not located a great distance

1 away. I believe it was 10 or 20 feet away.

2 So they were dealing with a relatively short
3 distance between the injection and the extraction
4 point. It was effective over a very short period of
5 time over that distance, but it would take longer for
6 the site as a whole.

7 Q Where is the low permeability unit that has
8 PCE in it at the site? Could you just describe that
9 generally for me?

10 A Yes. It's present --

11 Well, it's typically what we've been
12 referring to or at a similar depth to what we've been
13 referring to as the perched zone at Y-12.

14 Q Which is?

15 A There's a cross-section, Figure 4, that's
16 part of the report, which shows the general site
17 stratigraphy as it's been identified by Orion. It's
18 a low permeability layer, on average, lies between
19 approximately 70 and 80 feet below the ground
20 surface. It's in --

21 Q Just tell me the figure.

22 A -- this.

23 Q Yes. What is the figure?

24 A 4.

25 Q What are the concentrations in that zone of

1 PCE?

2 MR. SLOME: Which one?

3 THE WITNESS: The thick one. Yeah, thanks.

4 Monitoring well number 1, which is in the
5 perched zone. I'm reading this off a graph.

6 But the current PCE concentration, or most
7 recent as of the fall of 2011, was approximately
8 600 micrograms per liter in MW-1, and that's screened
9 from 75 feet to 95 feet. MW-2 was approximately 1700
10 micrograms per liter, the same screen interval. MW-4
11 with the same screen interval. It was approximately
12 750 micrograms per liter. MW-5 is approximately
13 1900 micrograms per liter. MW-6 is approximately
14 570 micrograms per liter. And MW-7 is approximately
15 700 micrograms per liter.

16 Those are the perched zone wells.

17 BY MR. MILLER:

18 Q Now, those are measurements of groundwater
19 in the area of the perched zone, correct?

20 A Yes.

21 Q Has somebody tried to measure the
22 concentrations and the low permeability material that
23 causes the perched zone to be there?

24 A The soil matrix concentrations?

25 Q Yes.

1 A Yes. I believe there's data in that regard.

2 Q Are the concentrations typically higher than
3 in the groundwater?

4 A I would say the highest soil matrix levels
5 that have been measured in that zone are comparable
6 to the highest perched groundwater concentrations
7 that have been measured recently.

8 Q What sample result are you looking at?

9 A I'm looking at Figure 5.4 of the Kester site
10 summary report which shows the measured soil matrix
11 concentrations in the 51- to 75-foot depth zone.

12 Q One of the things that can happen with
13 DNAPL, especially PCE, is it can overcome the
14 threshold required to penetrate clay, correct?

15 A If it pools to sufficient depth, yes. It
16 can overcome the --

17 Q Poor entry sure, I believe it's called?

18 A The hydrophobic nature of the clay, yes.

19 Q That DNAPL can be hard to locate in clay,
20 correct?

21 A Yes.

22 Q And hard to remediate because you don't know
23 where it is?

24 A It makes it more difficult to remediate if
25 you don't know where it is, yes.

1 Q Is there evidence of DNAPL releases at this
2 site?

3 A I think it's unlikely.

4 Q Were there spills of pure product at this
5 site; pure PCE, that is?

6 A It's likely that there were spills of pure
7 PCE onto the floor slab of the facility.

8 Q They had a drum storage area with
9 contamination problems?

10 A Well, within the chemical mixing and storage
11 area, which is adjacent to the drum storage area.

12 Q And that's the center of the contamination?

13 A Yes, in that vicinity.

14 Also in response to your prior question, I
15 should mention, in looking at the soil matrix
16 concentrations and the soil gas concentrations, they
17 would tend to suggest that there's probably not
18 DNAPL.

19 Q Why?

20 A They are too low.

21 Q What is too low?

22 A The highest onsite soil matrix concentration
23 that was measured at a shallow depth looks like it
24 was 99 milligrams per kilogram, or 99,000 micrograms.

25 Q 99,000 parts per billion?

1 A Yes.

2 Q What is the level at which the concentration
3 is indicative of the likely presence of DNAPL?

4 A I would say it becomes increasingly more
5 likely if you find levels above approximately
6 10 milligrams per kilogram in the soil.

7 Q 10,000 parts per billion?

8 A Yes.

9 Q Isn't 99,000 above 10,000 parts per billion?

10 A Yes.

11 I may have misspoke. I meant 10,000
12 milligrams per kilogram.

13 Q I don't think you meant that because that's
14 10 million parts per billion.

15 A Yes. Seeing those concentrations at
16 numerous sites, and you are getting into moderately
17 high solvent concentrations where there's likely to
18 be phase separated solvent in the soil at those
19 concentrations.

20 Q Aren't there quite a few published papers
21 that say concentrations lower than 10 million parts
22 per billion are indicative of DNAPL, including
23 published standard textbooks that are used to educate
24 people in your profession?

25 A Are you talking about groundwater dissolved

1 concentrations or soil matrix concentrations?

2 Q Let's take dissolved water concentrations.

3 A There are a number of publications that
4 discuss that subject.

5 One rule of thumb that I've seen mentioned
6 before is if you exceed 20 percent of the solubility
7 limit of a particular VOC.

8 Q 20 percent, not 1 percent?

9 A Correct.

10 Q You would be surprised to hear that in
11 standard textbooks today that are used to educate
12 hydrogeology students, that 1 percent is the rule of
13 thumb for groundwater?

14 A I think it depends on the number of
15 monitoring points that you have. If you've got a
16 site where you've got a relatively high number of
17 monitoring points, if you had DNAPL you are going to
18 see dissolved concentrations much, much higher than
19 that that would be detectible.

20 If you got dispersed, very dispersed
21 monitoring points that may be located larger
22 distances from a potential DNAPL location, then I
23 would agree that you could potentially have lower
24 concentrations, perhaps as low as 1 percent, that
25 would be indicative of the presence of DNAPL.

1 Q What is the standard textbook used today to
2 educate people in the hydrogeology field to get their
3 Bachelor's degree?

4 A Freeze and Cherry is still used pretty
5 extensively.

6 Q And what is the standard graduate textbook
7 on the subject?

8 A I don't know if there is what I would call a
9 standard graduate textbook. Freeze and Cherry is
10 still used quite a bit for graduate-level work as
11 well.

12 Q Isn't Bear used for graduate-level work?

13 A I'm not familiar with that. There's a
14 textbook by Stoler that's used pretty extensively as
15 well.

16 Q Which Stoler?

17 A Robert.

18 Q The one who lives in Orange County?

19 A Yes.

20 Q Turn to the section on "Documented Releases"
21 in your summary report, which I need to mark, and the
22 report figures, which I need to mark as Exhibits 38
23 and 39.

24 38 will be the summary and 39 will be the
25 figures.

1 (Plaintiff's Exhibits 38 and 39
2 were marked for identification and are
3 attached hereto.)

4 BY MR. MILLER:

5 Q 38 and 39 are reports on Kester Solder you
6 prepared?

7 A Yes.

8 Q I made sure I had a copy for myself. I may
9 have to swap you copies.

10 A That's okay.

11 Q No, you keep the ones with the exhibit tabs.
12 Could I have the other two, please, and also the
13 thick one you borrowed back that you said I could
14 have? I want a complete set at the end of the day.

15 A Oh, yeah, I forgot I gave that to you.

16 Q Section 3, "Documented Releases."

17 A Yes.

18 Q According to your summary, what is the
19 documented release of PCE at Kester Solder?

20 A I didn't see documentation of any release
21 that was noted in the available records.

22 Q Did they turn in an unauthorized release
23 report to the state or local oversight agencies?

24 A Specifically with respect to PCE?

25 Q We can start there. They may have said

1 something like VOCs and not been more specific, and I
2 would want to know about that.

3 A I don't believe I've seen that type of
4 report. There's correspondence from two or three
5 different regulatory agencies regarding the discovery
6 of PCE in the soil beneath the facility.

7 Q Could you turn to page 18 of your narrative?

8 A Which page?

9 MR. SLOME: 18.

10 BY MR. MILLER:

11 Q 18.

12 A Oh, of the document summary?

13 Q Yes.

14 A Yes.

15 Q March 25, 2006, Orion, the consultant
16 retained by Northrop at the site, estimated that the
17 SVE system would remove over 10,377 pounds within
18 two years based on the initial removal rate, correct?

19 A Yes.

20 Q How much did they actually remove?

21 A Just under 1000 pounds, as I recall.

22 Q Were they having trouble getting PCE out of
23 tight soils using the SVE system?

24 A Not for the upper soils, only for the
25 roughly 10-foot thick zone that we discussed earlier.

1 Q But that's not the reason for the
2 discrepancy between the estimate and the outcome,
3 correct?

4 A Correct.

5 Q Because the SVE system wasn't designed to
6 address contamination beneath the water table.

7 A Well, it wasn't --

8 The majority of that zone was not -- or has
9 not been below the water table. It was simply low
10 permeability but not saturated.

11 Q Okay. It was in a semi-perched -- or in a
12 perched zone, is what you are saying?

13 A Well, it was in a relatively low
14 permeability silt and clay layer that locally had --
15 well, locally the lower portion, lower few feet of
16 that silt and clay layer were saturated.

17 Q So why did the estimate vary from the actual
18 recovery so much, basically by a factor of 10?

19 A Because the initial VOC levels in the SVE
20 system when it was operated dropped off much more
21 quickly than the exponential decay model that Orion
22 had used in their estimate. And there's a copy of
23 the rate at which the VOCs -- the VOC levels in the
24 influent to that system dropped off as Figure 7 in
25 the 11-by-17 figure package.

1 Q They were using a vadose zone model to try
2 to predict the concentration they would remove?

3 A They used an attenuation model or curve that
4 they had attained from another site which had
5 generally similar, though not identical, soil
6 characteristics; so they thought it would give it a
7 reasonable estimate. But when they actually started
8 the SVE system at Kester, the PCE levels in the
9 influent to that system dropped off much more quickly
10 than at the other site.

11 Q Was that a vadose zone model?

12 A For both cases? I believe it was, yes.

13 Q Is it well-known that vadose zone models can
14 both under- and overestimate mass significantly?

15 A I'm not sure what you are asking.

16 (Whereupon Mr. Geocaris entered
17 the proceedings.)

18 BY MR. MILLER:

19 Q Is it well-known that the vadose zone
20 contamination is hard to model and models can over-
21 and underestimate it significantly?

22 A I think that's a fair statement.

23 Q This is just one example of where that is
24 true?

25 A Yes.

1 Q If you look at page 22 of your notes,
2 perched groundwater is about 86 feet below ground
3 surface.

4 A Which entry are you --

5 Q 7-15.

6 A At that time. That's no longer the case.

7 Q What is it now?

8 A I believe it's closer to 70 feet.

9 Q At page 24 you summarize a perched zone
10 hydraulic study report by Orion. Was the point of
11 that study to determine how feasible it was to get
12 PCE out of the perched zone and the confining layer
13 in that area?

14 A Yes, or to chemically oxidize it. They were
15 evaluating remedial alternatives.

16 Q Basically it's hard to get the chemical
17 oxidant into the low permeability material because of
18 the entry pressure required to do that?

19 A It's certainly harder than it is for a
20 higher permeability material, yes.

21 Q At page 25 of your notes, you indicate they
22 are going to attempt to inject 10,800 gallons of
23 3 percent permanganate solution?

24 A Yes.

25 Q Has that been done?

1 A No, I don't believe so.

2 Q Do you know when they planned to do it?

3 A I believe in late 2009.

4 Q Well, has it been done or not?

5 A I don't believe it has been done.

6 Q Page 27, you summarize an Orion memorandum,
7 and it contains a recommendation "Suspend
8 permanganate injection testing."

9 A Yes.

10 Q And they recommend performing high vacuum
11 soil vapor extraction?

12 A Yes.

13 Q But you testified earlier that that's not
14 going to work because of current recharge rates and
15 current groundwater levels.

16 A It would be more difficult today as a result
17 of the presently elevated groundwater level, such
18 that it may no longer be the most feasible approach.

19 Q Has Orion decided to go back to permanganate
20 injection in a report submitted to the state?

21 A I don't believe there is a report that has
22 been submitted, no.

23 Q Have they notified the state in writing that
24 they are going to go back to permanganate injection
25 yet?

1 A Not that I'm aware of.

2 Q Are they basically waiting for the
3 groundwater to lower?

4 A No. It's my understanding that they are
5 having what's referred to as a "RIES" committee
6 meeting, a remedial identification evaluation --
7 let's see. I should know that acronym. Remedial
8 identification -- essentially identification of the
9 remedial approach where they have a group of
10 consultants peer review the available data and
11 recommend what they believe to be the most feasible
12 approach.

13 Q Would that be a group of consultants within
14 Orion?

15 A No. I believe it's -- it would include
16 Orion representatives but predominantly consultants
17 and experts outside of Orion.

18 Q I take it it's a technically difficult
19 evaluation or it wouldn't be necessary for a meeting
20 like that?

21 A I wouldn't say that it's simple, but I think
22 it's a good approach to bring more eyes to bear on
23 the problem in order to make sure that the best
24 solution is identified.

25 Q Basically it's not very simple to get PCE

1 out of a confining unit, correct? That's the
2 problem.

3 A Well, you don't necessarily need to get it
4 out if you go with a chemical oxidation alternative,
5 but it's easier to get it out of higher permeability
6 soil deposits.

7 Q Are you familiar with situations where PCE
8 bleeding out of low permeability materials causes
9 sites to be contaminated for more than 100 years?

10 A No.

11 Q Are you familiar with the San Gabriel Valley
12 operable unit?

13 A Yes.

14 Q Isn't the estimated cleanup time on the
15 order of 200 years?

16 A Oh, I misunderstood your question.

17 I certainly have seen people estimate
18 extraordinarily long cleanup times. I have not seen
19 documentation of the condition, though, that you
20 described with your question.

21 Q You mean 200 years' worth of testing,
22 investigation and monitoring?

23 A Yes.

24 Q Basically our forefathers weren't doing it.

25 A It seemed like an easy question to answer.

1 Q Yes.

2 Well, there's certainly estimated cleanup
3 times with PCE in the hundreds of years that are
4 considered to be reasonable estimates, and planning
5 and remediation is based around that, correct?

6 A With pump and treat type systems or
7 approaches that don't address source removal, yes, it
8 can take a long time.

9 MR. MILLER: I told counsel I would try to stop
10 around 4:30.

11 MR. SLOME: You did.

12 MR. MILLER: We have an understanding that this
13 will be reconvened. Please let me know within the
14 next couple of days if you are going to modify your
15 position on reimbursement, what he's been paid --

16 MR. SLOME: Yes.

17 MR. MILLER: -- in total.

18 MR. SLOME: Yes. I shall do that.

19 MR. MILLER: All right. And then we will make
20 arrangements for a convenient time to address this
21 issue and get it resolved before we reconvene. And
22 I'm available to take your calls, I trust you have my
23 cell, on rescheduling.

24 MR. SLOME: No; but E-mail is fine.

25 MR. MILLER: We'll go off the video record for

1 this part.

2 THE VIDEOGRAPHER: This now concludes today's
3 deposition. We're going off the record. The time is
4 4:33.

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1 REPORTER'S DEPOSITION TIME LOG:

2

3 REPORTER - MARIANNA DONNER

4 DATE - THURSDAY, MARCH 15, 2012

5

6 WITNESS - GLENN D. TOFANI

7

8	ATTORNEY	ON RECORD	OFF RECORD	TOTAL
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9	MILLER	9:16 A.M.	10:27 A.M.	1:11
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10		10:39 A.M.	11:46 A.M.	1:07
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11		12:56 P.M.	2:28 P.M.	1:32
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12		2:42 P.M.	4:33 P.M.	1:51
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13			TOTAL USED:	5:41
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1 STATE OF _____)
2 COUNTY OF _____) ss.

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8 I, the undersigned, say that I have read the
9 foregoing deposition, and I declare, under penalty of
10 perjury under the laws of the State of California,
11 that the foregoing is a true and correct transcript
12 of my testimony contained therein, incorporating any
13 and all changes and/or corrections as noted by me.

14 EXECUTED this _____ day of _____,
15 2012, at _____.

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19

GLENN D. TOFANI
Volume 2

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4 I, the undersigned, a Certified Shorthand
5 Reporter of the State of California, do hereby
6 certify:

7 That the foregoing proceedings were taken
8 before me at the time and place herein set forth;
9 that any witnesses in the foregoing proceedings,
10 prior to testifying, were placed under oath; that a
11 verbatim record of the proceedings was made by me
12 using machine shorthand which was thereafter
13 transcribed under my direction; further, that the
14 foregoing is an accurate transcription thereof.

15 I further certify that I am neither
16 financially interested in the action nor a relative
17 or employee of any attorney of any of the parties.

18 IN WITNESS WHEREOF, I have this date
19 subscribed my name.

20

21 Dated: _____

22

23

24 _____
MARIANNA DONNER, CSR, RPR, CLR
25 CSR No. 7504